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STANDARDIZATION OF RASAMRUTAM AND ITS ROLE IN PEPTIC ULCER

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ABSTRACT

Rasagranthas mentioned materials of mineral, herbal and animal origin for preparing herbomineral drug i.e *Khalviya rasayan, Parpati rasayan, Pottali rasayan* and *Kuppipakwa rasayan* from *shodhit, jarit, marit* and *satwapatan* and other procedures and also mentioned medicinal properties and contraindication of above *dravyas* and *kalpa*. Importance of mercury i.e *'Rasa'* described in all *rasagranthas* superior to other *Maharasa, Uparasa, Sadharan rasa, Vish dravya* and *Ratna* & *upratna*. *Khalviya rasayan* is basic and simple preparation method of *kalpa* among the all preparations. There are some characteristic of this *kalpa* like, this *kapla* has more potency, high shelf life, minimum dose and good palatability. *Mardan samskara* has great importance in *kajjalikalpa*. In *mardan samskara* three procedures are taking place, pressure (drug particle size become very fine), friction (regenerate heat), motion (helps in mixing of dravyas and make homogeneous mixture and increase shelf life of kalpa.) Ulcer is defined as a break in the mucosa of the alimentary tract that extends through the muscularis mucosa into the submucosa or deeper. Peptic ulcer is chronic, most often solitary lesion that occurs in any of the gastrointestinal tract exposed to the aggressive action of acid/pepsin juices. Smoking, frequent use of NSAID and steroids, infection of H.pylori are some of the causes of peptic ulcer, which cause acute abdominal pain, haematemesis, bloating, nausea, vomiting, burping etc. leads to discomfort hence there is need to serve a authenticated, standardized, safe and cost effective formulation to the

mankind. *Rasamrutam* a herbomineral formulation mentioned in *yaogaratnakar* has minimum contents, easy to prepare and will be cost effective & work on this formulation on has not be done, so it is opportunity to work on this *kalpa* and may serve as one of the effective, substitute drug which will be authenticated and standardized formulation for most acute condition like peptic ulcer in human being.

KEYWORDS: - *Rasamrutam* – Preparation – Standardization – Peptic ulcer.

INTRODUCTION

According to *acharya Nagarjuna*, it is advocated to manufacture herbomineral formulation to treat chronic diseases, as *rasa-aushadhis* are required in minimum dose, giving instant effect, have more potency and long shelf life.[1]

Kajjali kalpa is a novel concept of ancient Indian drug delivery system. Even though the experts of *Rasashastra* consider *kupipakwa rasayana* and *pottali rasayana* as supreme, the *kajjali kalpa (khalvirasayanas)* are also equally effective *rasayogas* useful in *ayurvedic* practice. *Kajjali kalpas* are found effective in diseases of almost all strotasas. The effect may be multi-dimensional, free radicals scavenging, antioxidant, antimicrobial, catalytic, proenzymatic, immunomodulator. *Kajjali* complex is also more effective because of its longer stay and timed and sustained release; it shows gastrointestinal adsorption / stimulant and neuro-chemical irritability. It also suppresses auto immune reaction, adverse drug reactions and deranged hepatic metabolism. Black sulphide of mercury (*kajjali*) holistically and synergistically acts along with the herbal ingredients to bring multi systemic target organ effect in its complete sense. *Kajjali kalpas* also have *rasayan* property.[2]

A peptic ulcer is an open scar that develops on the inner lining of stomach, (a gastric ulcer) or the small intestine (a duodenal ulcer) both types are referred as peptic ulcer diseases. The main cause of peptic ulcer is faulty lifestyle such as improper diet, irregular meal timing[3] smoking,[4] alcohol,[5] stress,[6] consumption of NSAID[7] also H.pylori[8] infection and climatic changes.[9] Some common symptoms are abdominal pain, heart burn, indigestion, vomiting, and anorexia. But these conditions may suddenly lead to serious complications such as internal bleeding, haematemesis, melena, gastric- outlet obstruction and perforation.

At initial stage oral or intravenous (Proton pump inhibitor, H_2- blockers, antacid and alginates) medications are useful, but these drugs have severe adverse effects. In life

threatened conditions emergency surgery is required such as vagotomy, gastro-jejunotomy, partial-gastrotomy[10] etc.

Patient with peptic ulcer disease is usually physically weak and requires urgent treatment. The various treatment modalities are available for peptic ulcer in other medical streams but they have their own limitations. There are multiple options are available in classical texts to treat this emergency condition. "*Rasamrutam*'' is one of the formulations mentioned in *yogratnakar*, in *amlapitta chikitsa adhikara*, can be used to treat peptic ulcer disease. So the current study has been chosen with an aim to prepare a herbomineral formulation, also to develop its standard manufacturing process and to draw its standard analytical parameters.

Aim

a) Preparation and standardization of *rasamrutam* as mentioned in *yogratnakar*.

Objective

i) To carry out *samanya shodhan* of *Parad* as per method described in *Rasa tarangini* 5/27-30.
ii) To carry out *samanya shodhan* of *Gandhak* as per method described in *Ayurved prakash* 2/21-24.
iii) To prepare *Kajjali* as per the procedure described in *Rasa ratna sammuchaya* 8/5.
iv) To prepare *rasamrutam* formulation as per the procedure described in *yogratnakar amlapitta chikitsa*.
v) To analyze the study drug physico-chemically to develop its standard.

5. MATERIALS AND METHOD

Pharmaceutical Method

Preparation of *Rasamrutam:* - Material

Sr. No	Ingredients	Latin name	Part used	Quantity
1	*Shunthi*	*Zingiber officinale*	Rhizomes	4 Part
2	*Marich*	*Piper nigrum*	Fruit	4 Part
3	*Pipali*	*Piper longum*	Fruit	4 Part
4	*Haritaki*	*Terminalia chebula*	Fr.pericarp	4 Part
5	*Bibhitaki*	*Terminalia bellerica*	Fr.pericarp	4 Part
6	*Amalaki*	*Emblica officinalis*	Fr.pericarp	4 Part
7	*Musta*	*Cyperus rotundus*	Rhizomes	4 Part
8	*Vidang*	*Embelia ribes*	Fruit	4 Part
9	*Chitrak*	*Plumbago zeylanica*	Root	4 Part
10	*Shuddha Gandhak*	*Sulphurium*		2 Part
11	*Shuddha Parad*	*Hydrargyrum*		1Part

Analysis of raw materials

Physicochemical analysis of the authenticated ingredients was done before using the formulation.

Parad shodhan

Step–I: Shodhan with *Sudharaja*

1. In a clean black stoned mortar 200gm. of *Ashuddha Parad* (Mercury) was taken and same quantity of *Sudharaja* (Lime Powder – 200gm) was added to it.
2. The *mardana* of mixture was done uniformely for 72 hrs. After completion of 72 hrs. Of *mardana*, hot water (approx = 2 liter) was added & the mixture was stirred slowly.
3. After above process, the mixture was filtered through a thick double layered cotton cloth.
4. The mixture repeatedly was washed with hot water and allowed to sediment and supernatant water was discarded.
5. Finally settled *parad* at the bottom was collected & again washed with hot water and was kept in glass container and subjected to XRF analysis. Obtained *Parad* was used for further process.

Step–2: Shodhan of Parad using *shuddha saindhava* and *rasona kalka*

1. In *khalva yantra shudharaja shodhit parad* (150gm.), *rasona kalka* (150gm.) and *saindhava* 75gm. were taken and triturated for 8hrs. The changes occurred during the procedure were observed.

2. After *mardana* the obtained mixture was washed with hot water and *shuddha parad* was collected and XRF analysis was done.
3. Obtained *shuddha parad* (Hg) was stored in transparent, colourless glass bottle.
4. The mixture repeatedly was washed with hot water and allowed to sediment and supernatant water was discarded.

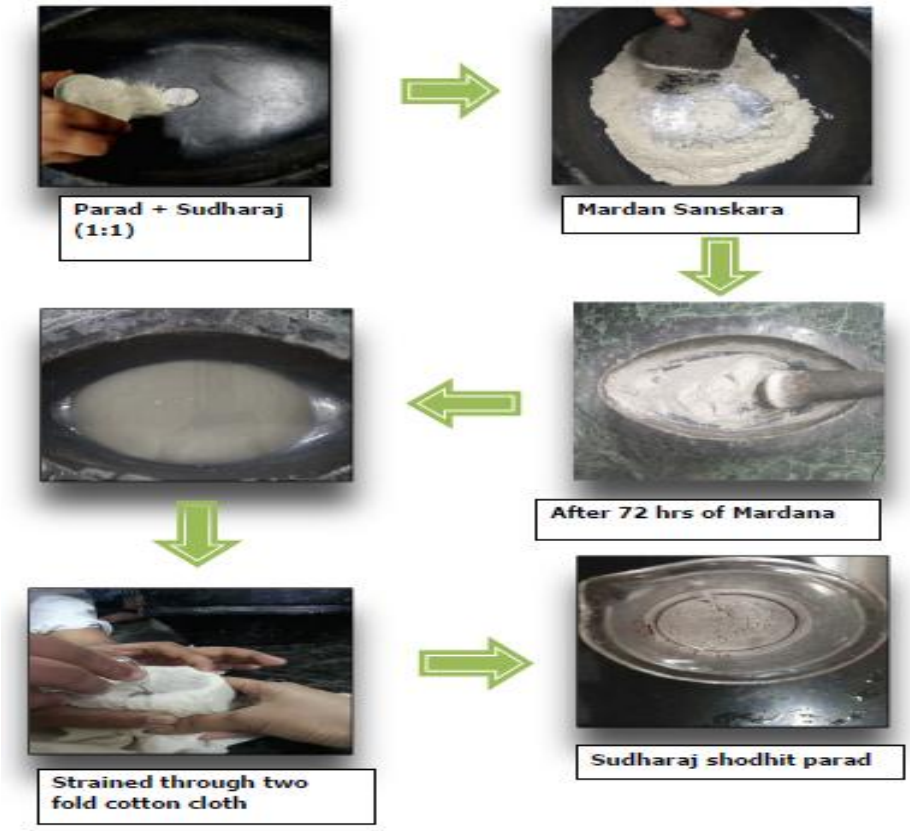

Figure 1: Parad Shodhan with Sudharaj.

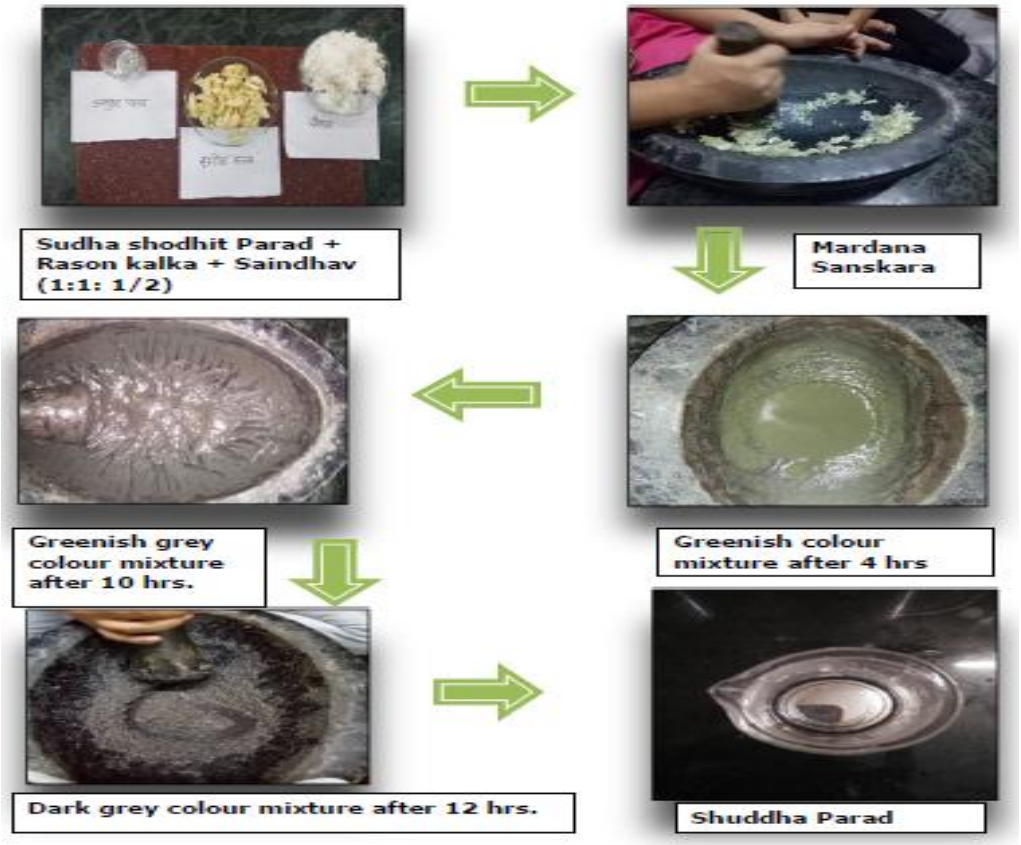

Figure 2: Parad Shodhan with Rason Kalka and Saindhav.

Gandhak Shodhan

Procedure

1. First of all in Stainless steel vessel 500 ml. of *godugdha* was taken and its mouth was covered with a white cotton cloth.
2. In an iron pan *goghritaa* (300 gm) was taken and kept on low flame.
3. After melting of cow ghee, powder of *ashudha gandhak* (300 gm) was added to it.
4. Then molten *ghandaka* was poured into *godugdha* through cotton cloth.
5. The purified cake of *gandhak* was removed from stainless steel vessel and washed with luke warm water. The obtained *gandhak* was dried and powdered.

The procedure was repeated for three times and sample of *shuddha gandhak* was sent for XRF analysis.

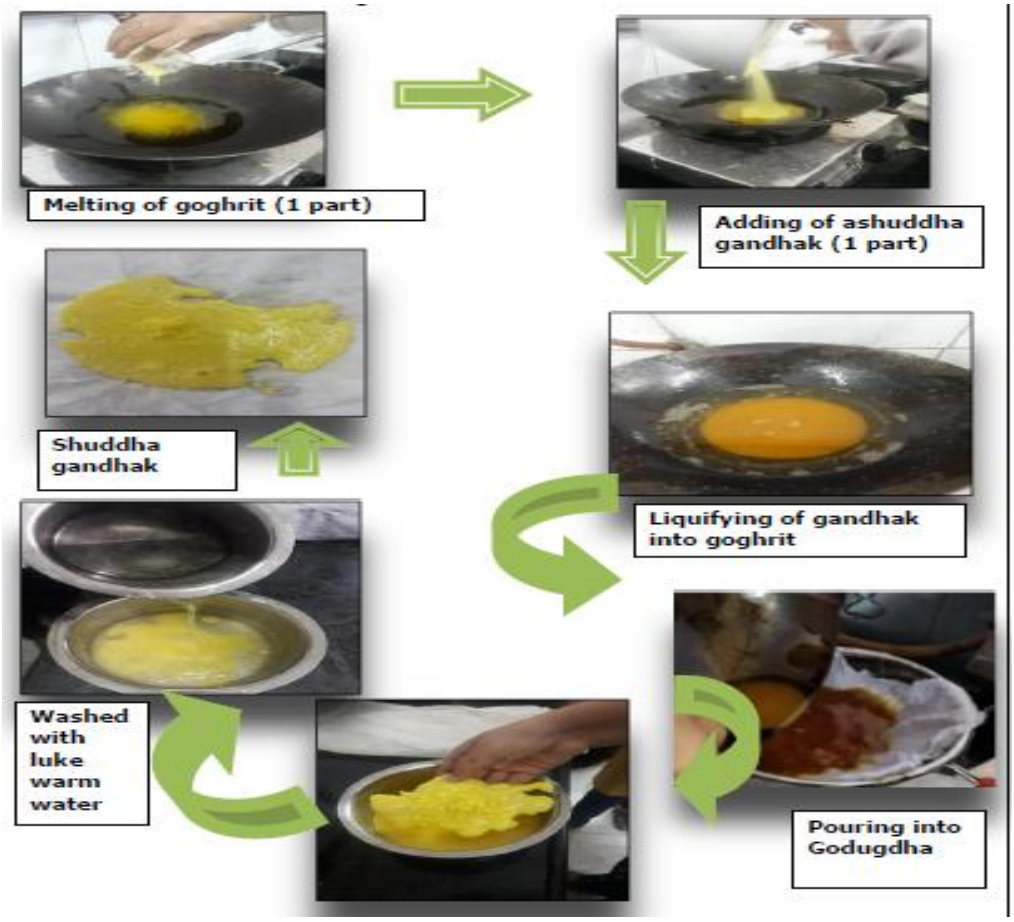

Figure 3: Gandhak Shodhan.

Kajjali Nirman

Procedure

1. 100 gm. of finely powdered *shuddha gandhak* was taken in *Khalava yantra* and 50 gm. of *shuddha parad* was added to it.
2. The mixture triturated for 72 hrs. Slowly but with uniform speed to obtain *Kajjali* of desired standard.
3. All *kajjali siddhi lakshanas* were observed as mentioned by *Rasagranthas* (Varitaratva, Rekhapoornatva etc).

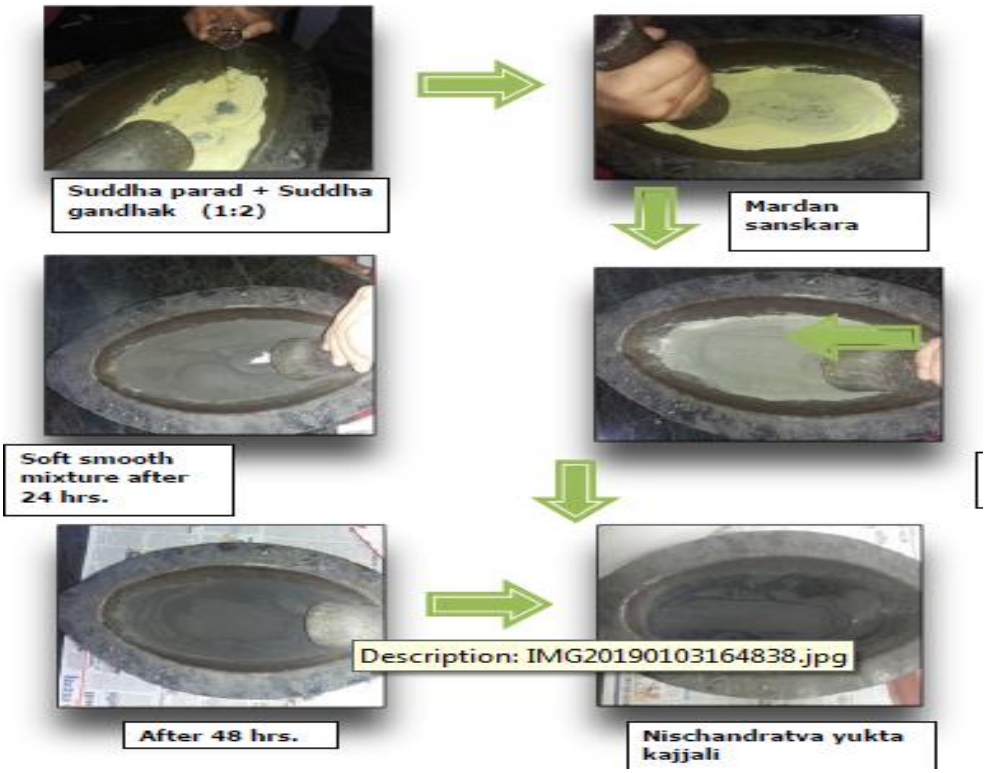

Figure 4: Kajjali Nirman.

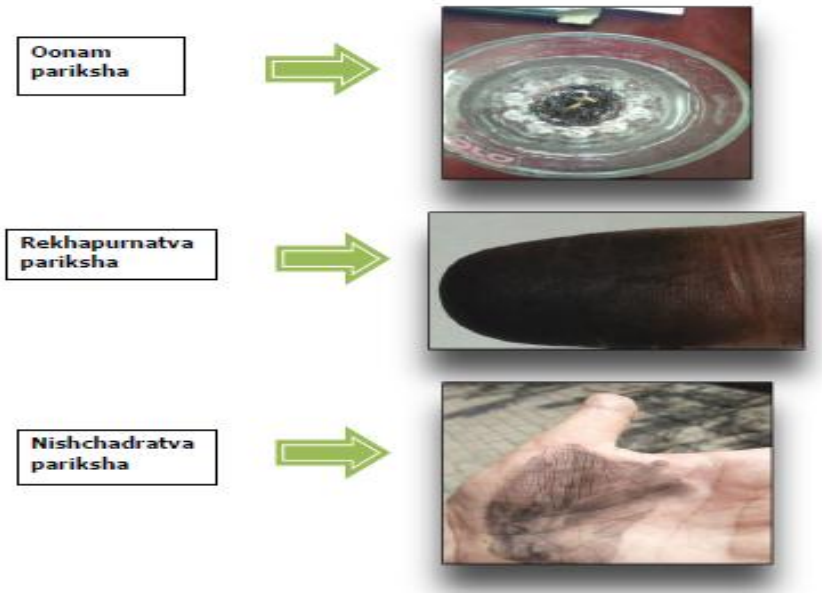

Figure 5: Kajjali.

CHURNA NIRMAN

Material

1. Dried fr.pericarp of Amalaki - 250gm.
2. Dried fr.pericarp of Bibhitaki - 250gm.
3. Dried fr.pericarp of Haraitaki - 250gm.

4. Dried fruits of Marich - 250gm.
5. Dried rhizomes of Shunthi - 250gm.
6. Dried fruits of Pimpali - 250gm.
7. Dried roots of Chitrak - 250gm.
8. Dried fruits of Vidanga - 250gm.
9. Dried rhizomes of Musta - 250gm.

Procedure

1. Cleaned and dried fr. pericarp of Amalaki was procured and broken with help of pounding apparatus.
2. The pounded dried drug was subjected for churnikaran process, for that purpose electric grinder was used.
3. The prepared churna was filtered by 100 No. sieve to obtain uniform and fine particles.
4. Same procedure was carried out to prepare the churna of well dried fr. pericarp of *Bibhitak*, *Haritaki*, fruits of *Marich*, *Pimpali*, *Vidanga* and rhizomes of *Shunthi* and *Musta*, and roots of *Chitrak*.

RASAMRUTAM *NIRMAN*

त्रिकटु त्रिफला मुस्ता विडङ्गचित्रकं तथा । एषां संचूर्णितानां तु प्रत्येकं तु पलं भवेत् ॥ १ ॥

कर्षव्दयं गन्धकस्य तदर्ध पारदस्यच । विडालपदमात्रं तु लिहयात्तन्मधुसर्पिषा ॥ २ ॥

शीतोदकं चानुपिबेत्क्रमाद्गव्यं पयस्तथा । अम्लपित्तमग्निमान्द्यं परिणामरुजं तथा ॥

कामलां पाण्डुरोगं च हन्यादेतद्रसामृतम् ॥ ३ ॥

(योगरत्नाकर अम्लपित्तचिकित्सा)

Sr. No	Contents	Quantity
1.	*Kajjali*	36 gm
2.	*Shunthi Churna*	48 gm
3.	*Marich Churna*	48 gm
4.	*Pipali Churna*	48 gm
5.	*Haritaki Churna*	48 gm
6.	*Bibhitak Churna*	48 gm
7.	*Amalaki Churna*	48 gm
8.	*Musta Churna*	48 gm
9.	*Vidanga Churna*	48 gm
10.	*Chitrak Churna*	48 gm

Procedure

1. First of all *Kajjali* (36gm) was taken in *Khalava Yantra* and after that fine churnas of, *Shunthi, Marich, Pipali, Haritaki, Bibhitak, Amalaki, Musta, Vidanga* and *Chitrak* were added one by one, the mixture was triturated properly for seven days to get homogenous mixture.
2. The well form *rasamuratam* was observed, collected and weighed, and kept in clean, dried and air tight glass container. Same procedure was carried for next two batches. Three batches of *rasamuratam* were prepared.
3. The samples were taken from each batch for analytical study.

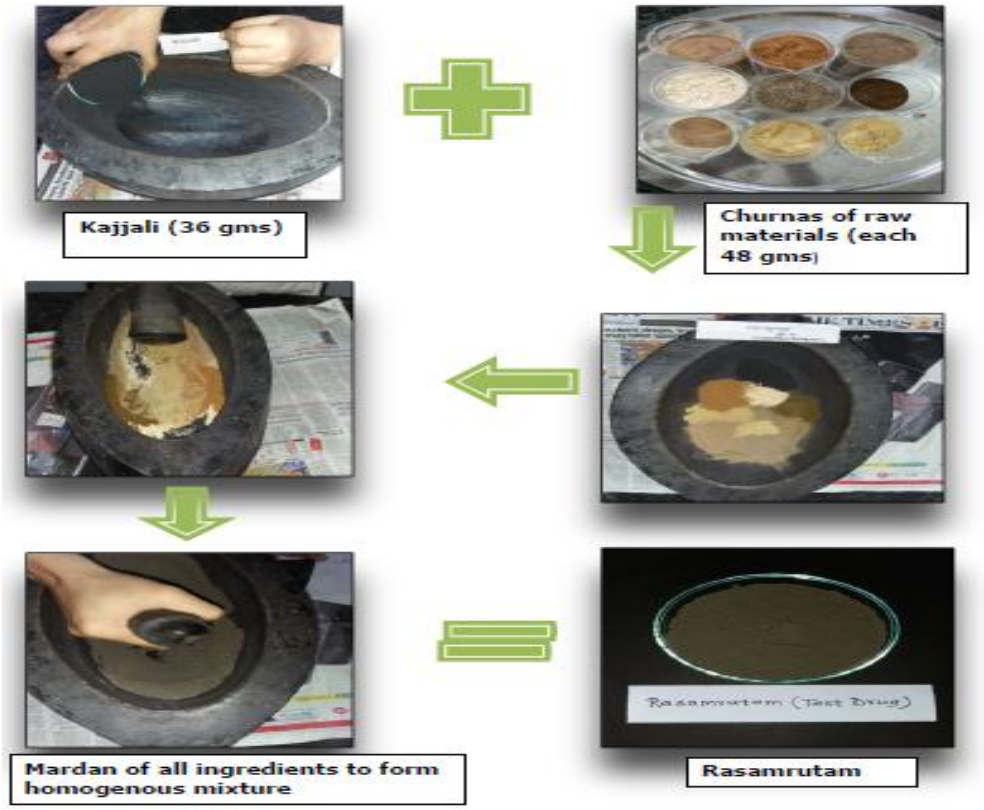

Figure 6: Rasamrutam nirman.

6. OBSEVATION AND RESULT

Section I - Drug preparation and its standardization.

1. *Parad shodhan*

Table No 1: XRF Analysis of raw mercury.

Material	Element	Mass (%)
Before shodhan	Mercury	100%
After shodhan	Mercury	100%

2. Shodhan of *Gandhak*

Table No 2: XRF analysis of *gandhak* during shodhan.

Duration	Element	Mass (%)	Formula	Mass (%)
Before shodhan	Sulphur	99.7		
	Calcium	0.230		
	zinc	0.0832		
After shodhan	Sulphur (S)	100.0	SO3	100.0
	Zinc (Zn)	0.0130	ZnO	0.0065
	Copper (Cu)	0.0104	CuO	0.0052

3. Preparation of *kajjali*

Table No 3: Organoleptic analysis of *kajjali*.

Sr. no	Properties	Observations
1.	*Shabda*	Not applicable
2.	*Sparsha*	Smooth
3.	*Roop*	Black (*kajjalabh*)
4.	*Rasa*	Not specific
5.	*Gandha*	Not specific

Table No 4: Physico chemical analysis of *kajjali*.

Sr. no	Parameters	Observed reading
1.	pH	7.2
2.	Loss on drying	0. 79 %
3.	Total ash %	0.29 %
4.	Acid insoluble ash %	0.67 %
5.	Water insoluble ash %	0.76 %
6.	Loss on ignition %	97.42 %

Table No 5; Observation of classical analytical tests for *kajjali*.

Sr. No	Parameter	Observation
1.	*Varitaratva pariksha*	+ve
2.	*Oonam pariksha*	+ve
3.	*Rekhapurnatva pariksha*	+ve
4.	*Nishchadratva pariksha*	+ve

Table No 6: XRF analysis of *kajjali*.

Element	Mass (%)	Formula	Mass (%)
Sulphur (S)	50.6	SO_3	70.3
Mercury (Hg)	49.2	HgO	29.6
Lead (pb)	0.0639	Fe_2O_3	0.0672
Molybdenum (Mo)	0.0446	MoO_3	0.0207
Arsenic (As)	0.0002	PbO	0.0176
Iron (Fe)	<0.0001	As_2O_3	<0.0001

Table No 7: Physico chemical analysis of raw .

Drug	Foreign matter	Moisture content	ASH	AIA	ASE	WSE	pH
Amalaki (Emblica officinalis)	NIL	3.2 %	5.06 %	1.08%	44.16%	52.88%	3.5
Bibhitak (terminalia belerica)	0.5 %	3.5 %	4.83 %	0.75 %	10.67 %	37.89 %	5.8
Haritki (Terminalia chebula)	Nil	3.5 %	3.81 %	1.14 %	43.88 %	62.43 %	5.5
Marich (Piper nigrum)	0.5 %	3.2 %	3.12 %	0.41 %	9.11 %	10.35 %	6.8
Shunthi (zingiber officinale)	Nil	3.0%	4.12%	1.02%	5.19%	15.60%	4.3
Pippali (Piper longum)	Nil	3.6%	4.23%	0.24%	9.23%	13.28%	5.6
Chitrak (Plumbago zeylanica)	Nil	4.0 %	2.24 %	0.38 %	12.80 %	13.42 %	4.8 %
Vidanga (Embelia ribes)	Nil	3.5 %	3.89 %	0.81 %	10.58 %	10.90 %	5.4
Musta (Cyperus rotundus)	Nil	4.0 %	4.21%	1.71%	7.10 %	14.16 %	5.2

Material

Table No 8: Rf values of Thin layer Chromatography of raw material.

Shunthi	Marich	Pipali	Haritaki	Bibhitak	Amalaki	Musta	Vidang	Chitrak
0.3	0.59	0.6	0.30	0.10	0.40	0.15	0.35	0.30
0.5			0.63	0.50	0.60	0.20	0.45	0.50
0.6			0.82	0.75		0.30	0.60	0.75
				0.80		0.65	0.80	0.85
				0.90				

Table No 9: Physico-chemical analysis of *rasamrutam*.

Parameter	Batch 1	Batch 2	Batch 3	Mean
pH	3.9	3.7	3.7	3.7
Foreign matter	Nil	Nil	Nil	Nil
Moisture content (%)	1.58	1.55	1.60	1.57
Total ash (%)	4.84	4.72	4.78	4.78
Acid insoluble ash (%)	0.97	0.88	0.94	0.93
Alcohol soluble extractive (%)	16.23	16.28	28.74	20.41
Water soluble extractive (%)	26.10	27.32	27.32	26.91

Table No 10: Rf value of Thin layer Chromatography of *Rasamrutam.*

Sr. No	Rf value
1.	0.40
2.	0.60
3.	0.70
4.	0.85
5.	0.90

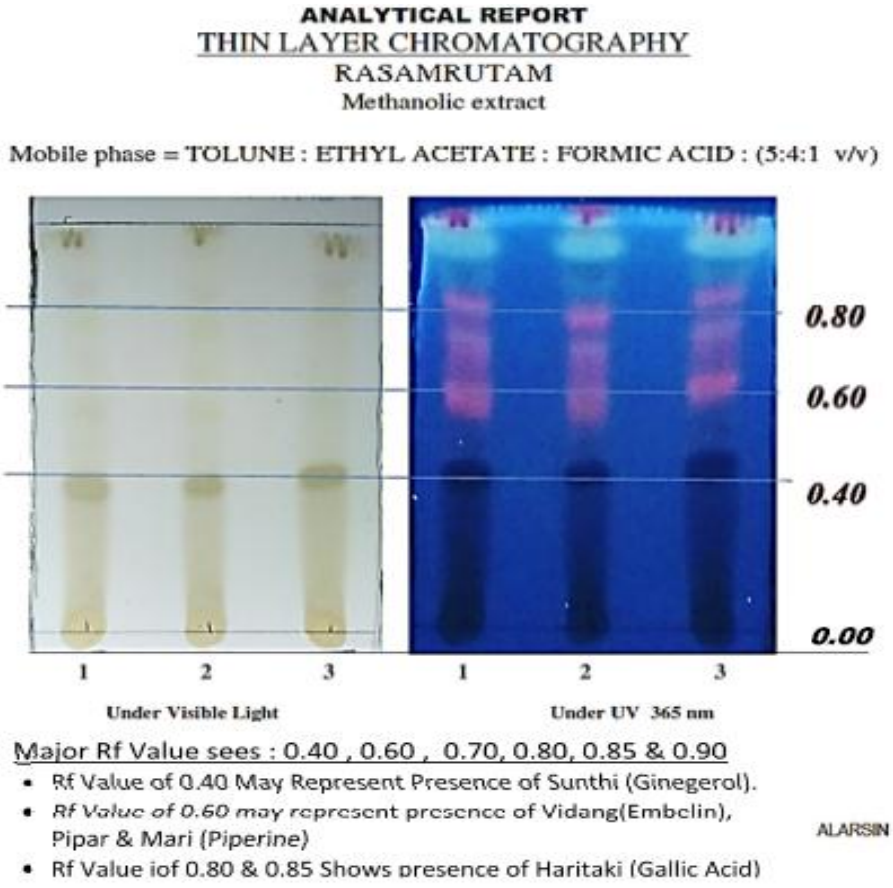

Table No 11: Organoleptic study of *rasamrutam*.

Sr.no	Properties	Batch 1	Batch 2	Batch 3
1.	*Shabda*	Not applicable	Not applicable	Not applicable
2.	*Sparsha*	Smooth	Smooth	Smooth
3.	*Roop*	Greyish black	Greyish black	Greyish black
4.	*Rasa*	*Katu*	*Katu*	*Katu*
5.	*Gandha*	Characteristic of Marich & pimpali	Characteristic of Marich & pimpali	Characteristic of Marich & pimpali

Table No 12: XRF analysis of *rasamrutam*.

Element	Mass (%)	Formula	Mass (%)
S (Sulphur)	45.5	SO_3	64.4
Hg (Mercury)	35.5	HgO	21.8
K (Potassium)	11.3	K_2O	7.74
Cl (Chlorine)	3.24	SiO_2	2.24
Ca(Calcium)	2.20	Cl	1.84
Si (silliocon)	1.84	CaO	1.74
Fe (Iron)	0.390	Fe_2O_3	0.316

6. DISCUSSION

The present study was undertaken to carry out the physicochemical standardization of *rasamrutam*, prepared from *shodhan* of *parad*, *shodhan* of *gandhak* and *churnas* of *shunthi*,

marich, pippali, haritaki, bibhitaki, amalaki, musta, vidanga & *chitrak*.

Rasamrutam nirman

1. All the contents of *rasamrutam* i.e *kajjali, shunthi churna, marich churna, pippali churna, haritaki churna, bibhitaki churna, amalaki churna, musta churna, vidanga churna,* and *chitrak churna* were taken in *khalva yantra* (black stone).The whole mixture was triturated with uniform speed for 7 days. Total three batches were prepared.
2. Trituration of herbal powders with *kajjali* brings out the structure of the compound as different layers of herbal ingredients with inert molecular layer of *kajjali* and this formation of chemically organized alternate layers of *kajjali* and herbal compounds continues proportionally with that of continued *mardana*.
3. Organoleptic analysis of *rasamrutam* showed it has *Krushna roop* and *mrudu sparsha, katu rasa* and didn't have any specific *gandha* and *shabda*.
4. Physico-chemical analysis of rasamrutam revealed pH 3.7, Foreign matter nill, Moisture content 1.57 %, Total ash 4.78 %, Acid insoluble ash 0.93 %, Alcohol soluble extractive 20.41 %, Water soluble extractive 26.91 % (table no 5.5.1).
5. XRF analysis result showed presence of Mercury 64.4 %, Sulphur 21.8 %, Potassium 7.74 %, Chlorine 2.24 %, Calcium 1.84 %, Sillicon 1.74 %, Iron 0.316 % (table no 5.5.4) and Rf values (table no. 5.5.3) 0.40, 0.60, 0.70, 0.85, 0.90.

Rasa, virya, vipaka* and *doshaghnata* of *rasamrutam

According to the properties of ingredients (table no- 5.5.5) of rasamrutam described in classical text, *rasamrutam* might be having:

Rasa	Katu
Virya	Ushna
Vipaka	Katu
Doshaghnata	Tridosha shamaka
Mahabhutadhikya	Vayu, agni

Probable Mode of Action

Principles of treatment of *amlapitta* and *parinam shoola* are *Agni vrudhhi chikitsa*; stabilize the functions of *tri doshas* and also *shodhan chikitsa*. All contents of *Rasamrutam* have *Deepana, Pachana karma* i.e. increasing appetite effect (Agni vruddhi) as per described in classics and counteract the dysfunctions of vitiated doshas. *Rasamrutam* acts on *Vyadhi adhisthana* (i.e *Amashaya*), reduces symptoms of *vyadhi* (*Amlotkesh, Hrutashoola, Shiroruja* and *Adhman* etc.) and also fulfills the principles of *chikitsa*. According to morden scientific

reaserch following activities of ingredients have been proved, *kajjali* acts as GI stimulant and catalyst.[2] *Shunthi* and *Marich* have gastro- protective activity,[12] anti-ulcerogenic[13] activity and activity against H.pylori bacteria.[14] *Pippali* has gastro- protective activity,[15] anti-ulcerogenic activity and hepato-protective activity.[16] *Haritaki* has gastro- protective activity,[17] anti-ulcerogenic activity, hepato-protective activity,[18] cyto-protective[19] and wound healing activity. *Bibhitak* has cyto-protective and anti-ulcerogenic activity.[20] *Amalaki* has gastr-oprotective,[21] anti-ulcerogenic[22] and wound healing activity,[23] *Musta* has gastro-protective,[24] anti-ulcerogenic acticity,[25] wound healing activity and activity against H.pylori bacteria, *Vidanga* has gastro-protective, anti-ulcerogenic activity, and wound healing activity. *Chitrak* has gastro-protective, anti-ulcerogenic activity[26] and activity against H.pylori bacteria.[27] So it can be assumed that *Rasamrutam m*ay has action on acid peptic disorders, mainly healing of peptic ulcer and prove to be having an anti- ulcerogenic activity in peptic ulcer.

7. CONCLUSION

Rasmrutam was formulated by trituration of Kajjali and Churnas of Shunthi, Marich, Pippali, Haritaki, Bibhitak, Amalaki, Musta, Vidanga and Chitrak together. According to drug literature review all herbal drugs have antiulcerogenic activity. The prepared formulation was in powder form. The following conclusions have been drawn on the basis of pharmaceutical and analytical study.

1. The procedure of *samanya shodhan* of *Parad* as per the method described in *rasatarangini* 5/27-30 is possible.
2. The procedure of *samanya shodhan* of *Gandhak* as per the method described in *Ayurved prakash* 2/21-24 is possible.
3. The *kajjali* of desired standards was obtained as per the procedure described in *Rasa ratna sammuchaya* 8/5.
4. The *Rasamrutam* formulation was prepared in 3 batches as per the procedure described in *Yogratnakar amlapitta chikita*.
5. In the large scale for preparation of rasamrutam electric mortar and pestle can be used.
6. To get the desired and standard output of rasamrutam continuous trituration with uniform speed and friction is required.
7. Standard *Rasamrutam* is having pH 3.7, foreign matter Nil, Moisture content 1.57%, Total ash 4.78%, Acid insoluble ash 0.93%, Alcohol soluble extractive 20.41%, and Water soluble extractive 26.91%.

8. The *Rasamrutam* having probable *Ras- Katu, Veerya- Ushana, Vipaka- Katu* and is having *Deepan, Pachana* and *Anuloman* property.

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