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A RESEARCH ON PHARMACEUTICO-ANALYTICAL STUDY OF CHANDANADI LAUHA

Dr. Shreya Avinash Jankar[1]*, Dr. Vaishali Shripad Balwande[2], Dr. Amruta Jagdish Rajenimbalkar[3]

[1*]Assistant Professor (Rasashastra Evam Bhaishajya Kalpana Dept.), [2]Assistant Professor (Dravyaguna Dept.), [3]Assistant Professor (Kriya Sharir Dept.)
Government Ayurvedic College, Dharashiv (Osmanabad)

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***Corresponding Author**
Dr. Shreya Avinash Jankar
Assistant Professor (Rasashastra Evam Bhaishajya Kalpana Dept.), Government Ayurvedic College, Dharashiv (Osmanabad).

ABSTRACT

Ayurved is a time-honored medicinal tradition originating in India. In which Rasashastra is the discipline concerned with preparing Herbo-mineral medicines. Chandanadi Lauha is type of Kharaliya Rasayana aimed at treating ailments through an integrated and holistic approach. It plays important role in treatment of fever and intermittent fever as well as Anaemia, Worm infestation, diabetes and Spleenomegaly but, practitioners are unaware of utility and their pharmaceutico-analytical properties.

KEYWORDS: Rasashastra, Kharaliya, Lauha, Vishama Jvara, Chandanadi Lauha.

INTRODUCTION

Ayurved, a natural system of medicine, originated in India quite 3000 years ago.[1] The concept of universal interconnectedness, the body's constitution (Prakriti), and life forces (Doshas) are the primary basis of ayurvedic medicine.[2] Ayurved objective is to help the healthy person to maintain good health and the diseased to promote human happiness at physical, mental and spiritual level.[3] Ayurved's principles are not only treat diseases effectively but also inspire researchers to deepen their understanding and enhance excellence in clinical practice.

Rasashastra, a branch of Ayurved is renowned from centuries, dealing with Rasa i.e.

Mercury and other metal & Mineral. Lauha preparations comprise iron as the chief component, blended with herbo-mineral combination. Lauha kalpa is mainly categorized under Khalviya Rasayana, yet it is also formulated in forms such as Churna, Vati, Avaleha, Rasakriya, Putapaka etc. form. Chandanadi lauha is classified as a Kharaliya Rasayana, in which Lauha Bhasma serves as the principal component, while the accompanying herbal drugs act predominantly as antipyretics, available in tablet or powder form. It's chiefly indicated in the management of chronic intermittent fever.

AIM: To evaluate the pharmaceutico-analytical properties of "Chandanadi Lauha"

OBJECTIVES

A. Primary objectives

1. Preparation of Hingula Marita Lauha Bhasma
2. Preparation of Chandanadi Lauha.

B. Secondary objectives

1. Shodhana of Lauha and Hingula
2. Pharmaceutico-Analytical study of Chandanadi Lauha

MATERIAL AND METHOD

The present study was designed as a pharmaceutico-analytical research work to evaluate its analytical properties of Chandanadi Lauha in the management of intermittent fever especially.

Materials

1. Raw Drugs: All herbal and mineral ingredients required for Chandanadi Lauha were procured from the authentic Ayurvedic pharmacy.
2. Authentication: Authentication of Iron-fillings, Hingula, was done in a reliable institute. Identification and authentication of Herbal raw materials was done from the Dravyaguna Experts of the institute as well as Manakarnika Aushadhayala and Pune University.
3. Lauha Bhasma Preparation: Primarily Lauha shodhana by samanya and Vishesh shodhana according to Rasatarangini as well as Rasaratna Samucchaya was done. After that Lauha Bhasma was prepared according to the classical reference of Rasashastra text, Rasatarangini and standardized based on API guidelines.
4. Other Ingredients: Supporting herbal drugs were cleaned, dried, and powdered as per classical methods.

Formulation Method

The trial drug, Chandanadi Lauha, was prepared following the Khalviya Rasayana method, and was also converted into suitable dosage forms such as Churna / Vati / Avaleha / Rasakriya as per requirement.

1. Samanya Shodhana of Lauha[4] - Firstly, the raw Lauha scraps was heated on Bhatti up to red hot condition and then dipped into the Tila Taila, Then it is separated from Tila Taila and again heated up to red hot and immersed into different samples of Tila Taila. Same procedure was repeated for 7 times. Then this Lauha was similarly treated by using Takra, Gomutra, Kanji and decoction (Kwatha) of Kulattha.

Ashuddha Lauha Churna

Red hot condition

Quenching Process (Nirvap)

2. Vishesh Shodhana of Lauha[5]- Samanya shodhita Lauha was taken and quenching in Triphala kwatha for 7 times. Each time fresh Triphala kwatha was used.

Samanya Shodhit Lauha **Heating Lauha to Red hot**

Triphala Kwatha Nirman **Quenching of Lauha in Kwatha**

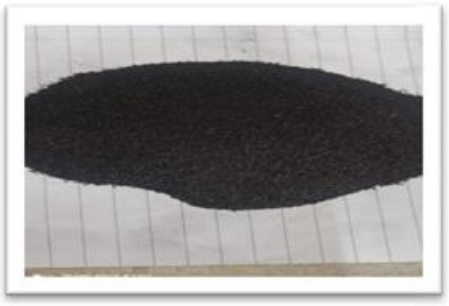
Vishesh Shodhit Lauha

3. Hingula Shodhana.[6]- Impure Hingula was taken and Bhavana of Ardraka Swarasa was given for 7 times. Then it is ready for use as an ingredient.

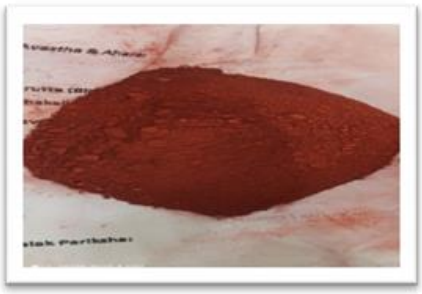
Ashuddha Hingula **Shuddha Hingula**

1St Shodhana **Ardraka Swarasa** **Last Shodhana**

Lauha Marana - For the Lauha Marana the Putapaka method mentioned in Rasatarangini was preferred.[7] The Lauha Churna obtained after Vishesh Shodhana procedure was mixed well with 1/12th part of Shuddha Hingula and bhavana of Kumari swarasa was given. Then after 7th puta upto 17th puta=Lauha churna was subjected to bhavana with Triphala kwatha.[8]



Shuddha Lauha



Shuddha Hingula

Kumari Swarasa

Triphala Kwatha

Trituration of Shu. Lauha + Shu. Hingula+Bhavana Dravyas

Before Puta Process

After Puta

Lauha Chakrika after 1st Puta

Lauha Chakrika after 10th Puta

Lauha Chakrika after 20th Puta

4. Preparation of herbal drug churna for Chandanadi Lauha- Small pieces of each drug were made separately with the help of Khalva yantra. These small pieces were grounded through mixer separately. Grounded part was sieved through mesh no. 85 to get fine powder.

Table No. 01: Showing Contents and its Properties.

Sr. No	Contents	Rasa	Virya	Vipaka	Properties
1.	Lauha Bhasma[9]	Tikta, Kashaya	Sheeta	Katu	Jvaraghna, Sarvavyadhihara, Gulmaplih vishapaha

2.	Raktachandan[10]	Madhura, Tikta	Sheeta	Katu	*Pittahara, Vrishya, Vishaghna, Netraroga*
3.	Wala[11]	Tikta, Madhura	Sheeta	Katu	Jvaraghna, Dipana, Pachaka
4.	Patha[12]	Tikta	Ushna	Katu	Jvaraghna, Dahaprashama, Vishaghna
5.	Khasa[13]	Tikta, Madhura	Sheeta	Katu	Jvaraghna, Dipana, Pachaka
6.	Pimpali[14]	Katu	Anushna-Sheeta	Madhura	Yakrutottejana, Rasayana, Jvaraghna
7.	Haritaki[15]	Pancharasa (Lavanavarjita) Kashaya pradhan	Ushna	Madhura	Jvaraghna, Dipana, Pachana, Yakrutettojaka
8.	Shunthi[16]	Katu	Ushna	Madhura	Dipana, Pachana, Sheetprashamana
9.	Nilkamala.[17]	Kashaya, Madhura, Tikta	Sheeta	Madhura	Dahaprash mana, Vishaghna, Jvaraghna
10.	Amalaki[18]	Amla, Madhura, Kashaya	Sheeta	Madhura	Dipana, Rasayana, Tridoshanashaka
11.	Musta[19]	Tikta, Katu, Kashaya	Sheeta	Katu	Dipana, Pachana, Jvaraghna
12.	Vidanga[20]	Katu	Ushna	Katu	Krumighana, Pachana, Agnivardhan
13	Chitraka[21]	Katu	Ushna	Katu	Dipana, Pachana, Yakrutottejana

5. Preparation of Chandanadi Lauha[22]: Firstly Lauha Bhasma and all herbal churna were added to the mixture and trituration was done. After that 150 ml Herbal drugs 0f Chandanadi Lauha Kwatha was added as a bhavana dravya and trituration was done to form homogenous mixture. Trituration was done for about 1 Prahara i.e 3 hours. After that approximately 125 mg weighted Vati were prepared manually and dried it. These Vati were preserved, stored and labeled.

Trituration of Herbal Drugs + Lauha bhasma

Kwatha- Herbal Drug of same ingredients of Chandanadi Lauha

Ingredients + Bhavana to form dough

Prepared Vati of Chandanadi Lauha

OBSERVATION AND RESULTS- Stepwise observations are recorded during the process and presented in this section.

A. pharmaceutical Observation

1. OBSERVATION OF LAUHA SHODHANA

a. Observation of Samanya Shodhana Of Lauha- Observations was noted during samanya shodhana.

Table No. 02: Showing changes in physical characteristic of Lauha after Samanya shodhana.

	Raw Lauha	**Tila taila**	**Takra**	**Kanji**	**Gomutra**	**Kulattha Kwatha**
Colour	Silvery Grey	Grayish black	Blackish Grey	Blackish brown	Grayish brown	Dark Brown
Hardness	Hard	Reduced	Reduced +	Reduced ++	Reduced +++	Reduced +++
Thickness	Thick	Reduced	Reduced +	Reduced ++	Reduced ++	Reduced +++
Lustre	Metallic	Reduced +	Reduced +	Reduced ++	Reduced ++	Reduced +++
Brittleness	-	Increased +	Increased +	Increased ++	Increased++	Increased+++

Results of Samanya Shodhana of Lauha

Initial weight of Lauha- 1000gms Final weight- 1007gms

Gain in weight- 7gms Percentage gain- 0.7 %

b. OBSERVATION OF VISHESH SHODHANA OF LAUHA- Observations during Vishesh Shodhana-

Table No. 03: Showing numerical summary of various parameters obtained during the pharmaceutical process of Vishesh Shodhana of Lauha.

Quench no.	Time taken for becoming red hot (Min:Sec)	Temperature of media before quenching (^{0}C)	Temperature of media after quenching(^{0}C)	Weight of Lauha before quenching (g)	Weight of Lauha after quenching (g)
1.	30:10	29	73	1007	1002
2.	29:50	29	77	1002	996
3.	29.20	29	74	996	1006
4.	28:40	29	72	1006	1008
5.	27:20	29	73	1008	1014
6.	27:00	29	75	1014	1022
7.	26:50	29	73	1022	1035

Result of Vishesh Shodhana of Lauha

Colour- Dark black

Appearance- Light fragile in nature, Charred like charcoal Initial weight of Lauha- 1007 g Final weight of Lauha- 1034 g Gain in weight- 27 g Percentage weight gain- 2.65 %.

2. Observations in Hingula Shodhana

Table No. 04: Observations in Hingula Shodhana.

No. of Bhavana	Day	Duration of Mardana in hrs	Quantity of Swarasa Added	Shabda	Sparsha	Roopa	Gandha	Chandrika
1st	1 Day	2 hrs 40 Min	85 ml	Khara	Rough	Red	Like Ardraka	Present ++++
2nd	2 Day	2 hrs 40 Min	80 ml	Nishabd a	Smooth +	Bright Red	Like Ardraka	+++
3rd	3 Day	2 hrs 48 Min	75 ml	Nishabd a	Smooth +	Bright Red	Like Ardraka	++
4th	4 Day	2 hrs 34 Min	65 ml	Nishabd a	Smooth ++	Bright Red	Like Ardraka	+
5th	5 Day	2 hrs 30 Min	60 ml	Nishabd a	Smooth ++	Bright Red	Like Ardraka	Absent (Nischandra)
6th	6 Day	2 hrs 24 Min	55 ml	Nishabd a	Smooth +++	Bright Red	Like Ardraka	Absent (Nischandra)
7th	7 Day	2 hrs 20 min	50 ml	Nishabd a	Smooth +++	Bright Red	Like Ardraka	Absent (Nischandra)

Table No. 05: Result of Hingula Shodhana.

Sr.No.	Quantity of Hingula Taken	Time Taken	Hours Taken	Quantity Obtained	Weight Gain/Loss
1	500 gms	08 Days	18 Hrs 48min	537 gms	Gain, 37Gms

3. OBSERVATION OF HINGULA MARITA LAUHA BHASMA

Table No. 06: Observations in Preparation of Hingula Marita Lauha Bhasma.

Puta No.	Wt. before	Wt. of Hingula Added	Wt. after	Max. temp	Duration	cow dung cakes	Colour of Bhasma	Consistency
1	200Gms	16.6gms	202Gms	360°C	8 hrs	1kg	Blackish	Hard
2	202Gms	16.83gms	204Gms	360°C	8 hrs 15mins	1kg	Blackish	Rough
3	204Gms	17gms	207Gms	500°C	8 hrs 9mins	1.25Kg	Blackish Brown	Rough, pellets hard
4	207Gms	17.25gms	212Gms	500°C	7 hrs 36mins	1.25kg	Brown	Slightly Rough
5	212Gms	17.66gms	220Gms	550°C	7 hours 42mins	1.25kg	Dark brown	Slightly Soft, pellets Hard
6	220Gms	18.33gms	228Gms	580°C	7 hrs 30mins	1.5kg	Dark brown	Soft, pellets fragile
7	228Gms	19gms	238Gms	595°C	7 hrs 35min	1.5kg	Dark brown	Soft
8	238Gms	-	246Gms	650°C	7 hrs 48min	2kg	Dark brown	Soft
9	246Gms	-	258Gms	700°C	7 hrs 42min	2.5kg	Dark brown	Soft
10	258Gms	-	267Gms	720°C	7 hrs 29min	2.5kg	Dark brown	Very soft, pellets hard
11	267Gms	-	266Gms	739°C	7 hrs 5 min	2.5kg	Reddish brown	Very soft, pellets fragile
12	266Gms	-	261Gms	764°C	7 hrs 12min	2.75kg	Reddish Brown	Very soft
13	261Gms	-	255Gms	779°C	7 hrs 15min	2.75kg	Reddish Brown	Very soft
14	255Gms	-	246Gms	808°C	6 hrs 56min	3kg	Reddish Brown	Very soft
15	246Gms	-	239Gms	790°C	6 hrs 38min	3kg	Brownish Violet	Very soft
16	239Gms	-	228Gms	750°C	5 hrs 46min	2.75kg	Brownish Violet	Very soft
17	228Gms	-	219Gms	730°C	5 hrs 25min	2.75kg	Brownish Violet	Very soft
18	228Gms	-	219Gms	700°C	5 hrs 25min	2.50kg	Brownish Violet	Very soft

19	228Gms	-	219Gms	700°C	5 hrs 25Min	2.50kg	Brownish Violet	Very soft
20	228Gms	-	219Gms	700°C	5 hrs 25Min	2.50kg	Brownish Violet	Very soft

Observations during Bhavana procedure

-Average quantity of Triphala kwatha required for each bhavana before every puta was approximately 80-100 ml.

-Average time required for each bhavana was nearly 5-6 hours. With the progress of Putas the time required for Bhavana as well as the quantity of Triphala kwatha reduced due to the gradual reduction in particle size.

Observations during Chakrika nirmana (pelletization)

-Change in colour was observed with the progression of Putas, from brownish black to dark red. After Puta pellets became so fragile that they could be manually powdered by fingers also. Average time taken for complete drying of pellets was nearly 12 hours.

Hardening of pellets after puta indicated that the heat given was more and so less cow dungs were used for the next puta. It was easy to make pellets due to reduction in particle size after each puta.

General observations made before and after Puta

-After completion of puta, the metallic shine (Chandrika) was completely lost. Colour of Lauha turned to brownish violet from dark black. Lauha became so fine that 95% of bhasma passed through 350 no. sieve. Due to fineness of Lauha, 100% Rekhapurnatva was observed on completion of process. The bhasma became so light (Laghu) in weight that it passed 85% Varitaratva. With the progress of Puta, number of cow dung cakes required was reduced, as particle size of Lauha reduced.

Results of Hingula marita lauha bhasma procedure

Initial weight of Lauha = 200gms Final weight of Lauha = 219gms Gain in weight of Lauha = 19gms

- Percentage Gain in weight = 9.5 %

4. OBSERVATIONS IN HERBAL CHURNA PREPARATIONS

Table No. 07: Average Loss in weight during Churna Preparation.

Raw drug name	Final wt. (g)	Final wt. (g)	Final wt. (g)
Raktachandan	50	41	9
Netrawala	50	44	6
Patha	50	43	7
Ushira	50	42.5	7.5
Pippali	50	41	9
Haritaki	50	40	10
Shunthi	50	43	7
Nilotpala	50	41	9
Amalaki	50	42	8
Musta	50	42	8
Vidanga	50	43	7
Chitraka	50	42	8

5. OBSERVATIONS OF CHANDANADI LAUHA

-After preparation of homogenous mixture of all herbal ingredients eg. Raktachandan, Shunthi, Ushira, Vidanga etc. colour of mixture became brownish yellow.

-After adding Lauha bhasma and herbal drugs it became brownish in colour. Time required for mardana was about 3.5 hrs.

-After mardana with all herbal drugs kwatha, All ingredients were mixed homogenously and uniformly. Mixture became homogenous and soft in consistency

Result of Chandanadi Lauha by using Hingula Marita Lauha Bhasma

Colour- Brown

Consistency- Uniform particle sized tablets

Initial weight of all drugs before mardana- 120gms Final weight of prepared Chandanadi Lauha – 117gms Loss in weight- 3gms

Percentage of loss in weight- 2.5 %

2) ANALYTICAL STUDY

A) Lauha bhasma Analysis

a) According To Ayurvedic Parameters

Table No. 08: Observations of Ayurvedic Parameters of Hingula Marit Lauha Bhasma.

Sr.No	Ingredients	Sparsha	Rupa	Rasa	Gandha
1.	Lauha Bhasma Hingula Marita	Smooth, no perceptible	Pakwa-Jambu Phala(Brownish violet)	Tasteless (Niswadu)	No specific

BHASMA PARIKSAHA

Table No. 09: Bhasma Pariksha of Hingula Marita Lauha Bhasma.

Bhasma Pariksha	Lauha Bhasma Hingula Marita
Nishchandratva	No metallic luster
Rekhapurnatva	Fill the space in between fingers Lines
Varitaratva	Floats on water
Niramla	Passed even after 48 hrs
Apunarbhava	No recurrence of Lauha Dhatu
Unnama (Uttama)	Floats on water
Nirdhuma	No smoke seen

b) Modern Parameter

1. Scanning Electron Microscopy

Table No. 10: Particle size of Chandanadi Lauha by SEM by various magnifications is as seen below.

Magnification	Particle size
100x	100 µm
5000x	5 µm

Scanning Electron Microscopy of Chandanadi Lauha was done by various Magnifications i.e. upto 100x, 500x, 1000x, 2000 x, 5000x. It is observed that maximum particle size of Chandanadi Lauha was 100 µm and minimum size was upto 5 µm. So it can be said that Chandanadi Lauha contains nano size particles which is very important for its quick and *Yogavahi* action.

B) FINAL PRODUCT ANALYSIS

The Chandanadi Lauha's organoleptic characteristics are shown below.

Organoleptic characteristics of Final product Chandanadi Lauha

a) Traditional Parameters

Table No. 11: Showing Organoleptic characteristics of Final product Chandanadi Lauha according to Traditional Parameter.

Sr. No.	Final product	Shabda	Sparsha	Rupa	Rasa	Gandha
1.	Chandanadi Lauha	-	Smooth Vati	Brown, Circular Tablets	Tikta, Kashaya	No Specific

b) Modern Parameters

Table No. 12: Showing Organoleptic characteristics of Final product Chandanadi Lauha according to Modern Parameters.

Sr. no.	Parameters	Chandanadi Lauha
1.	Description	Colour- Brownish Odour -Faint Taste –Bitter and Astringent
2.	Ph	4.25
3.	Moisture content @ 110^0C	4.98%
4.	Total ash content	52.12%
5.	Solubility in Water	15.8%
6.	Water Soluble Extract	9.54%
7.	Solubility in HCl	57.82%
8.	Average weight	0.117 gm
9.	Hardness	1.98 kg/cm^2
10.	Disintegration time	>15 min
11.	Friability	0.001%
12.	Limit test for heavy metals in ppm Mercury	0.89ppm
13.	Iron as Fe content	9.56 %

2. XRD- (X-ray Diffraction Method)

Table N0. 13: Showing Identified Patterns of XRD results of Chandanadi Lauha Identified Patterns List.

Visible t [°2Th.]	Ref. Code	compound Name	Displacemen	Scale Factor	Chemical Formula
*	98-063- 91697	Mercury Sulfide	0.000	0.304	Hg1 S1
*	98-006-4999 13	Iron	0.000	0.028	Fe1
*	98-063-3288 3	Pyrite	0.000	0.193	Fe1 S2
*	98-063-3304 6	Iron Sulfide (1/2)	0.000	0.203	Fe1 S2
*	98-007-0054 5	Cinnabar	0.000	0.095	Hg1 S1
*	98-015-7861 9	Mercury-Gamma	0.000	0.180	Hg1

3. TLC

Table no. 14, 15, 16, 17: Showing TLC of Chandanadi Lauha.

Eye Observed Iodine Chamber

Sr. No	RF Value	Colour	Sr. No	RF Value	Colour
1.	0.85	Yellow	1.	0.86	Brown
2	0.77	Yellow	2	0.85	Brown
			3.	0.82	Brown
			4.	0.77	Brown

254nm Observed 365nm Observed

Sr. No	RF Value	Colour	Sr. No	RF Value	Colour
1.	0.86	Yellow	1.	0.86	Yellow
2.	0.85	Yellow	2	0.85	Yellow
3.	0.82	Yellow	3.	0.82	Yellow
4.	0.77	Yellow	4.	0.77	Yellow

CONCLUSION

Chandanadi Lauha is generally used in Vishama Jvara mainly. Also it is used in Mandajvara, Jirna jvara, Pandu, Hastapaadtala Daha, Netra Daha, Krumi, Prameha, Shirovedana. Also it used to Increase Jatharagni. The major ingredient of Chandanadi Lauha is Lauha Bhasma. It has Tikta, Kashaya rasa and Ruksha guna. Also shows Raktavardhaka, Tridoshaghna, Lekhana, Rasayana, Balya and Deepana properties which ultimately help in vyadhinashana.

Most of the ingredients of Chandanadi Lauha are mainly of Sheeta in guna which plays role in Jvara shanti. Some of them shows Rasayana property as well Chitraka, Musta and Shunthi have Deepana, Pachana Properties which ultimately helps in Agnivardhan.

Analytical tests shows Particular values in Chandanadi Lauha.

pH of Chandanadi Lauha shows Acidic in nature. Moisture Content of Chandanadi Lauha within normal limits, hence it has more life span. Total Ash Content of Chandanadi Lauha came within normal values. Solubility in Water of Chandanadi Lauha is also found normal. Solubility in HCl of Chandanadi Lauha also came under limits. Disintegration time of Chandanadi Lauha is >15 min. XRD of Chandanadi Lauha shows peaks of Hg1S1 (Mercury Sulfide), Fe1 (Iron), Fe1S2 (Iron pyrite), Fe1S2 (Iron Sulfide), Hg1S1 (Cinnabar), Hg1 (Mercury-Gamma Hp). So the Study concludes that self prepared Chandanadi Lauha shows various Pharmaceutico-analytical properties.

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