

Comparative Study of Gandhaka Shodhan by different methods

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Abstract

It is clear from the observations and inferences that the physical properties like a) Colour, b) Odour, c) Melting Point and d) Chemical properties shows some changes.

Possible reasoning for this and its significance is discussed here. Colour :- There are slight changes in colour of Shuddha Gandhaka. It may be due to the different substances used for shodhan as Godugdha and Goghrita. But there is no change in colour of sublimed Gandhaka as it is not treated by any other substance. Odour :- There was notable change in smell of Shuddha Gandhaka which is treated by Godugdha and Goghrita. But sublimed Gandhaka was not treated by any other substance, so its smell remain some. Melting Point :- Changes in melting point of Shuddha Gandhaka were noted. They may be due to adherence of the material used for Shodhana as they are in the form of Carbon. Change in melting point of

sublimed Gandhaka can not be defined. It may be due to changes of transition temperature of Gandhaka form as solid to vapours. Elemental Analysis :- Particle size was reduced and there was coating of fats shown as Carbon in Shuddha Gandhaka which was treated by Goghrita and Godugdha. This Gandhaka becomes more effective as per its Vyavai guna. Due to coating it may achieve the target site as per time releasing property.

Key words – Ghandaka, Gandhaka Shodhan, Shodhit Gandhaka.

Introduction :-

Ras Shashtra is the science, which deals with the study of Parada, Gandhaka, Minerals, Animal products and the methods of preparation of their Kalpas i.e. Rasaushdhi. There are many references available in ancient Samhitas about the substances used in Ras chikitsa like Parada, Gandhaka etc. The following reference expressed the importance of Gandhaka in Ras Shastra. Parada cannot

act as Roganashak (Curative) without mixing Gandhaka with it⁽¹⁾.

In Arya Chanakya's Kautilliya Arthashastra, there is reference of Rasvedhaj Suvana which is made from Gandhaka jarit Parada. In Sushrut Samhita Shwitrakushthgna Lepa was described which contains Gandhaka Compounds⁽²⁾. In Charak Samhita 'Muktadhya Churana' was described which contains Parada, Gandhaka and others⁽³⁾.

By all above references, we can see that the Gandhaka was in use since 1000 to 1500 B.C.

Aims

- 1) To study the different methods of Gandhaka Shodhan given in Ayurvedic Texts.
- 2) To compare Shuddha Gandhaka from different shodhan process by its physical and chemical properties.

Objectives

- 1) To study Gandhaka Shodhan processes given in Rasa Shastra Literature.
- 2) To study and observe Shodhana Processes of Gandhaka in Laboratory.

Literature Review:

Occurance (Origin) of Gandhaka

- 1) As per Ras Taranginee Gandhaka was Artava (menstrual discharge) of Goddess Parvatee⁽⁴⁾.
- 2) At first Gandhaka's origin was at 'Shwetadweepa' which is at South Italy. Naturally Gandhaka was originated from volcanos which are in Sicily. Due to its typical pungent smell it is known as Gandhaka⁽⁵⁾.
- 3) As per Ayurvedic Texts Gandhaka occurs from.

- a) Animal sources like Eggs, blood, milk, stool and bile.
- b) Plant Sources :- Garlic, Mustard, Onion, Bark of Neem, Tomato, Grapes, Seetaphal, Pineapple, Apple and Lime etc.
- c) Mineral Sources :- Suvana Makshik, Raupya Makshik, Vimal, Sasyak, Manahshila, Hingul etc.

In India it occurs in Maharashtra, Kashmir, Madras, Punjab, Bihar, Aasam and Orrisa.

4) As per Modern Chemistry

Gandhaka occurs in nature in various forms like gas, ores of metals and Sulphates.

Gandhakais produced in various chemical reactions⁽⁶⁾.

- i) $\text{H}_2\text{S} + 2\text{SO}_2 \rightarrow \text{H}_2\text{SO}_4 + 2\text{S}$
- ii) $2\text{H}_2\text{S} + \text{O}_2 \rightarrow 2\text{H}_2\text{O} + 2\text{S}$
- iii) $\text{SO}_2 + \text{H}_2\text{O} \rightarrow \text{S} + \text{O}_2 + \text{H}_2\uparrow$

Synonyms of Gandhaka

A) As per regional languages

- a) Sanskrit, Marathi, Hindi, Gujrathi → Gndhaka
- b) English → Sulphur
- c) Latin → *Sulpurates, Succur*
- d) Arebi → Kivrit
- e) Farashi → Gogirda

B) As per Historical Origin – Gauripushpa, Gauribeeja, Shivarajah

C) Upamatmak – Bali, Balivasa

D) Swabhavdarshak – Vaigandha, Gandhaka, Atigandha, Krurgandha, Putigandha, Gandhamadan, Lelee, Lelitak.

E) Karyadarshak – Dhatumari, Dhatuvairi, Shulbari, Vat,

Rasbandhak, Sutjeet,
Sutveeryaprada.
F) Gunadarshak – Pamari,
Kusthari, Krumighna.

Types of Gandhaka (Sulphur)

1) As per Ayurvedic Text :-

A) Gandhaka is of four types –

- i) Shuklavarnee
(Shwetavarnee)
- ii) Shukpichhabh
(Peetavarnee)
- iii) Shuktundakhya
(Raktavarnee)
- iv) Krushnavarnee

Shukpichhabh Gandhaka is known as Aawalya or Aamalsar Gandhaka, which is available easily and used in Ayurvedic medicine.

B) Modern types of Gandhaka as per Ayurvedic Text book –

- i) Pushpa Gandhaka
(Sublimed Sulphur)
- ii) Dugdha Gandhaka
(Precipitated Sulphur)
- iii) Dhauta Gandhaka
(Washed Sulphur)
- iv) Krushna Gandhaka (Black Sulphur)

2) As per Modern Chemistry :-

A) Solid Gandhaka:- it is of 4 types

- i) Cycloota Sulphur (S_8)
- ii) Cyclohexa Sulphur (S_6)
- iii) Cyclosulphur
- iv) Catena Sulphur (S_5)

B) Liquid Sulphur

Properties of Gandhaka

1) As per Ayurveda Text :-

Ras – Madhura, Vipak – Katu,
Veerya – Ushna.

It is Kandughna, Kusthagna, Dipak, Pachak, Aamnashak, Pittashodhan due to its Sara (Purgative) guna.

It acts on Rasa, Rakta, Mansa, Meda, Asthee, Majja and Shukra dhatu by its Rasayan property.

2. As per Modern Chemistry :-

Physical Properties:-

- Chemical Symbol - S
- Molecular Weight - 32.06
- Atomic No. - 16
- Melting point - 115°C
- Boiling point - 444°C
- Specific Gravity - 1.957

Gandhakais pale yellow in colour, brittle and crystalline solid.

When heated it melts to yellow, mobile Liquid at 113°C ; after raising the temperature it's liquidity minimises and colour becomes blackish. At 232°C it becomes solid and black coloured. At above 232°C it liquifies again and at 444°C it boils and brownish red vapours comes out.

Gandhakais insoluble in Water. Soluble in Carbon Disulphide, Benzene and Turpentine Oil.

It is bad conductor of heat and electricity. It combines directly with many metals like Copper, Silver, Iron, Parada etc⁽⁷⁾.

Grahya Gandhaka

As per Ayurved Prakash 2/18 – Parrot's tail coloured (Yellow), smooth as butter to touch, hard and Snigha Gandhak is supposed to be the best for medicine preparation. It is known as Aamalsar or Aawalya Gandhaka.

Gandhaka Dosha

1) As per Ayurved Text – Gandhaka contains two foreign matters

as doshas viz. a) Particles of stone and b) Poison (harmful properties came to Gandhaka from poisonous substances like Arsenic)⁽⁸⁾

It is therefore to be purified very carefully.

Intake of Ashuddha Gandhaka (Impure Sulphur) causes Kushtha, Dah, Bhrama, Pittaj vikar and loss of beauty⁽⁹⁾.

2) As per Modern Chemistry – Intake of impure Gandhak causes fever, skin rashes, conjunctivitis, joint pain, urticaria, Haematuria, bronchospasm, leukopenia, Epistaxis, rarely plastic Anemia.

It causes CNS disturbances like confusion, depression, ataxia, titinus, fatigue, acute psychotic episodes. Rarely peripheral neuritis, Goitre and Hypothyroidism⁽¹⁰⁾.

So Gandhaka must be used as Ras or Rasayan after proper shodhan process.

Materials and Methods

To study the different methods of Gandhaka Shodhan as prescribed in Ayurvedic texts and compare the Shuddha Gandhaka from different shodhan processes by its physical and chemical properties. We have selected four different methods of Gandhaka Shodhan to obtain harmless Gandhaka.

The material used for these methods were easily available and the procedures were easy to perform. So I have chosen these methods.

In our study, native Gandhakawas to be subjected to ‘Shodhan’ by two methods. Samples of Gandhaka were drawn from each procedure. Changes were observed by their physical and chemical properties. Comparison was

noted in their reported properties to each other and with Ashuddha Gandhaka.

1) Method No. 1 –

Material – i) Ashuddha Gandhaka 50 gms., ii) Goghrita 150 gms., iii) Godugdha 450 ml, iv) Water as required.

Ashuddha Gandhaka powder was melted with an equal part of Goghrita and poured immediately through cloth into a pot, which was filled 3 times Godugdha of Gandhaka. Withdrawn Gandhaka from pot, then washed with hot water and dried. Repeated this procedure for 3 times totally. For Shodhan process Goghrita and Godugdha was used separately. This sample is labeled as A-3⁽¹¹⁾.

After completion of Shodhan process 44.4 gms of Shuddha Gandhaka was collected. There was 11.2% loss in weight of Ashuddha Gandhaka.

Shuddha Gandhaka appears greenish yellow coloured having pungent smell, reduced with Goghrita's smell. No shining was seen.

2) Method No. 2 –

Material – i) Ashuddha Gandhaka 160 gms.

We have taken 4 Palas (160 gms) of Ashuddha Gandhaka powder. Putted it in Damaru Yantra. After sealing, Damaru Yantra was putted on medium fire for 4 Prahar (12 hours). Cooling process by Toyadhar was continued for 12 hours. Melted Gandhak vapours were collected inside into upper earthen pot. After 12 hours Yantra was taken outside from fire. When cooled down separated both earthen pots and Shuddha Gandhaka was collected from inside adherant to bottom of upper pot. Mala like stone particles were gathered at the bottom of lower pot. This sample is labeled as B-1.

After this shodhan process 154 gms. of Shuddha Gandhaka was collected. There was 3.75% loss in weight of Ashuddha Gandhaka⁽¹²⁾.

Shuddha Gandhaka appears clear yellow and less pungent in smell.

Above study was conducted in the Department of Ras Shastra & B.K., K.D.M.G.'s Ayurved Medical College & Hospital, Chalisgaon, Dist. Jalgaon.

Observations :

1) **Colour :-** There was change in colour between 4 samples and Ashuddha Gandhaka.

- a) Yellow – Ashuddha Gandhaka
- b) Greenish Yellow – Shuddha Gandhaka by Goghruta and Godugdha

c) Clear Yellow – Shuddha Gandhaka by Damaru Yantra

2) Odour :-

- a) Pungent Smell – Ashuddha Gandhaka
- b) Slight Ghee's Smell with reduced pungent smell – A-3
- c) Less pungent smell – B-1

3) Melting Point :-

- a) Ashuddha Gandhaka – 114⁰C
- b) Sample A-3 – 121⁰C
- c) Sample B-1 – 119⁰C

4) Free Sulphur % in various samples :-

Sr. No.	Sample	Free Gandhaka%	Carbon %
I	Ashuddha Gandhaka	97.05	0.28
Ii	Sample A-3	90.73	2.28
Iii	Sample B-1	90.86	Absent

5) % Loss after Shodhan Process :-

Sr. No.	Sample	Before Shodhan Weight	After Shodhan Weight	% Loss
i	Sample A-3	50 gms	44.4 gms	11.2%
ii	Sample B-1	160 gms	154 gms	3.75%

Discussion –

1) **Colour :-** There are slight changes in colour of the samples. There is no objective parameter to detect slight difference in colour.

2) **Odour :-** Some changes are there in smell of various samples. Sample A-3 shows Goghruta's smell due to Goghruta used for Shodhan. Shuddha Gandhaka sample reduced pungent smell may be due to substances used for shodhan as Godugdha, Goghruta, Damaru Yantra shodhit Gandhaka

has no special smell as it was not treated by any other substance.

3) Melting Point :-

- i) Ashuddha Gandhaka's melting point is lowest as 114⁰C.
- ii) Goghruta and Godugdha shodhit Gandhaka's melting point increases by 7⁰C.
- iii) Damaru Yantra Shodhit Gandhaka's melting point increases by 5⁰C.

4) **% Loss after Shodhan :-** Minimum % Loss in the Damaru Yantra Shodhit Gandhaka.

Conclusion :-

Amongst many methods of Gandhaka Shodhan can be used in drug preparation, two methods were selected.

Commercially available Gandhaka was used for Shodhan Sanskar by these methods.

Physical and Chemical properties were tested by i) Colour, ii) Odour, iii) Melting Point, iv) Elemental Analysis.

1) **Colour** of Shuddha Gandhaka shows some changes. They may be due to different substances used for Shodhan.

2) **Melting point** of Gandhaka shows increased after shodhan. These differences may be due to adherence of material used for shodhan. But in Damaru Yantra shodhit Gandhaka no possible reason can be explained for increase in melting point.

3) **Odour :-** The change in smell of Goghruata, Godugdha Shodhit Gandhaka was mostly due to substances used for shodhan. But Damaru Yantra Shodhit Gandhaka has no change in smell as no other substance was used for this process.

4) **Elemental Analysis :-**

a) Goghruata and Godugdha Shodhit Gandhaka's particle size in reduced. It was coated by fats in the form of Carbon. So it may act as Vyavai and time released property. As per Ras Shastra texts this Gandhaka can be use as single drug. As it was having less carbon i.e. 2.28% it may absorb earlier. Gandhaka treated by 1 time only by this process can be use for making other Kalpas like Kajjali.

b) Damaru Yantra Shodhit Gandhaka's particle size was reduced. It may act as its Vyavai guna. There is no

Carbon coating so it may not have time releasing property.

As per Ras Shastra Texts Damaru Yantra Shodhit Gandhaka is supposed to be the best. So it can be use for all purposes. Because no any other substance was used for Shodhan in this method.⁽¹³⁾

As per Ras Shastra Texts Gandhaka treated for 7 times can be use in other Kalpas as Parpati as it has maximum Carbon i.e. 4.74%. But 3 times Shodhit Gandhaka by this method can be use only as single drug as it has less Carbon i.e. 3.17%.

With this methods of Gandhaka Shodhan we cannot correlate the properties mentioned in modern chemistry books. For this purpose further study of Shodhit Gandhaka is essential. That is out of scope at this stage.

All these conclusions cannot be taken as concrete and final, because the observations were tried to correlate with Ayurvedic references.

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