

**Review Article****PHARMACEUTICO THERAPEUTICS OF SULPHUR (GANDHAKA) AN AYURVEDIC REVIEW**

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Received 14 March. 2018; Accepted 04April. 2018

ABSTRACT

The term Sulfur or Sulphur derived From the Sanskrit word "Shulvari"(Shulva + Ari) meaning enemy of shulva or copper metal(Anti-copper). Sulphur occurs free in abundant quantities and hence was probably known to ancients. The Greek and Roman were familiar with the uses of sulphur oxides in fumigation and bleaching.

Almost all Acharyas included Gandhaka in Uparasa Varga. Gandhaka seems to be best among all Rasa and Uparasa varga dravya.¹ It is also believed that only Gandhaka is able to form all types of Lauha into Bhasma form.² Acharya Shyamsundaracharya praises Gandhaka in a unique way under heading 'Gandhaka Pradhanyam' in his classic.³

As per modern medical science, sulphur regulates the sodium/potassium electrolyte pump within each cell. It also helps in detoxification and is a vital part of immune system. Sulphur is a component of insulin and it functions along with thiamine and biotin in a normal sugar metabolism. It also helps in tissue repair. It has been referred to as 'Nature's beauty mineral' as it keeps hairs, skins, fingernails strong and healthy. It maintains skin's elasticity.

Almost all Rasashastra classics have quoted Karma of Gandhaka as Deepana, Pachana, Rasayana, Vrishya, Balya, Aamdoshanashaka, Vishaghna. As per Rasa Ratna Samucchaya, "*Gandhashma ati rasayanah*"⁴ and "*Haret rogan kustha mrityu jaradika*"⁵. Gandhaka Kalpa of Rudrayamala mentions the use of Gandhaka as Rasayana and longevity by its use in 'Kalpakrama'.⁶ Daily up to 1 Prastha Gandhaka has been advised in 'Kalpakrama'. Kakachandishwara Kalpa Tantra reveals almost all herbal drug kalpa except one, which is 'Gandhaka Kalpa'. It shows Gandhaka as "*Vikhyato jaravyadhinashakah*" and mentions some Gandhaka kalpa for Rasayana purpose also.⁷ Shuddha Gandhaka, as per Rasa Ratnakara, Rasayana Khanda, administered as 'Kramana Yoga' along with Godugdha for 'Shrikantha Rasa'⁸ and 'Mritasanjivani Gutika'⁹. It indicates that use of Gandhaka as Rasayana had begun in earlier times.

Keywords: Gandhaka, Sodhana, Gandhanasana, Satwapatana

INTRODUCTION:

Gandhaka was known to Indian since olden days. Vedic literature shows no mention of Gandhaka. No synonym of it was found in any Veda. It was first used by the Aryans for medicinal and fumigation purpose, later on followed by the Greeks and the Romans. Our ancient treatise Charaka, Sushruta and Astanga Hridaya Samhita has used Gandhaka both internally and externally in skin disorders. In the Rasashastra classics, Gandhaka holds a very important place and is used

extensively in Parada related processes and as a ingredient in various formulations.¹⁰

Nirukti

"Tivra gandhatvam iti gandakah".¹¹

The substance which possesses strong smell is called Gandhaka. Due to its pungent odour, it is known as Gandhaka.

According to rasa literature, gandhaka stands next to Parada in importance. It is also considered as an essential agent for the various processes of Parada

such as Murchhana, Jarana etc. It is believed to impart many desirable properties to Parada and reduces its toxic effects.¹² Gandhaka has been included in Uparasa varga and is the foremost drug of this group.¹³

As per Rasa Ratna Samucchaya, origin of Gandhaka is from Goddess Parvati's Raja (menstruation blood) indicating its 'Agnikari' guna. It is originated at the time of 'Samudra Manthana' with Amrit.

Mythological origin¹⁴

Vernacular Names

Table 1: Showing Vernacular Names

Sanskrit	Gandhaka	English	Sulphur
Persia	Gogird, Gangird	Bengali	Gandhaka, Gandrak
Gujarati	Gandhaka	Hindi	Gandhaka or Bali
Assamia	Kiburit	Marathi	Gandhaka
Telugu	Gandhakamu	Kannada	Gandhaka
Tamil	Gandhakamu	Punjabi	Gandhaka
Burma	Kau	Latin	Brimstone
Arab	Kibrika	Malyalam	Baliranga

Synonyms^{15,16}

Synonyms can be classified as follows-

Table 2: Showing Synonyms

Sr. No.	Synonyms According to	Synonyms
1	Bhavartha	Gauripushpa, Gauribija, Shivaraja, Daityendra
2	Upama	Bali, Balivasa, Balivatsa, Shukapuccha, Navneeta, Pita Gandhaka, Vasakar, Vasavat
3	Swabhava	a) Vaigandha, Gandhaka, Atigandha, Kruragandha, Gandhesh, Putigandha, Saugandhika, Gandhamadana, Gandhamaadan, Sugandho, Gandhapashana, Gandhashma, Divyagandha. b) Leli, Lelitaka, Lelitaka vasa, Lelinaka, Lelinaa.
4	Karya	a) Action on dhatu-Dahtuha, Dhatuvairi, Dhatumari, Lohahara. b) Action on Tamra – Shulbashatru, Shulbari, Shulbaripu c) Action on Parada – Vata, Rasabandhaka, Sutajita, Sute, Rasagandhaka
5	Gunas	Veeryaprada, Kushthari, Pamari, Krimighna, Jantuha, Kitaghna, Kitanashana, Nikrintaka.

Occurrence^{17,18,19}

Sulphur occurs in Free State near volcanoes and in combined state in different minerals and mental ores. The United States has been the leading producer of sulphur since 1900. Most of it is produced in Louisiana and Texas. The other countries that produce sulphur include Canada, Japan, Poland, Soviet Union, Chili, Philippines, etc. In India sulphur is found as a mineral in Bihar,

Rajasthan, Assam, Andhra Pradesh, Maharashtra, etc.

Varieties of Gandhaka

On the basis of colour, Rasashastra classics classified Gandhaka into 4 types (Below table no. 1). Chemically, Gandhaka is of single type.

Showing varieties, qualities of Gandhaka according to different Acharyas

Table 3: Showing the Varieties according to various classics

Name of the texts	Rakta (Red)	Peeta (Yellow)	Shweta (white)	Krishna (Black)
Rasa Tarangini	-	Colour like Haridra, Soft like Butter	-	-
Rasamritam	-	Greenish yellow (Like Amalaki)	-	-
Rasa Paddhati	-	Amalaka chhavi	Inferior	-
Rasa Chintamani	-	Amalasara	Shwetabh peeta	-
Rasarnava, Rasaratna Samucchaya, Rasendra, Purana,	Shreshtha	Madhyama	Adhama	-
Rasayana Sara, Rasendra Purana, Rasendra Bhaskar, Br. RasaRaja Sundara	Raktamlasara	Peetamlasara	Loniya	-
RasaRatna samucchya, Rasendra, sara samgraha, Ayurved prakash, Yoga ratnakar, Rasakamadhenu, Rasendra purana, Rasa jala nidhi, Br. Yoga tarangini, Rasendra bhaskara, Rasa chandanshu, Rasa prakash sudhakara, Br. Rasa raja sundara, Bhava prakash, Rasedra chudamani	<ul style="list-style-type: none"> • Shukatundakhya or shukachanchunibha • Shreshtha • Useful in Dhatuvada 	<ul style="list-style-type: none"> • Shukapiccha, amalsara • Shrestha or medium quality • Used for medicinal purpose 	<ul style="list-style-type: none"> • White in colour, khatika • Lowest quality • Used for Lepana and Dhatumarana 	<ul style="list-style-type: none"> • Black in colour • Durlabha • Jaramrityu hara
Ananda kanda	Kshatriya	Vaishya, madhyama	Vipra, ashma	Kshudra, adhama

Acceptable Variety of Gandhaka

As per Ayurveda Prakash²⁰, Gandhaka which is having colour of parrot tail feathers, similar to Navneeta, Masrina (Mridu), Snigdha (unctuous in nature), Kathina (hard) is considered as shrestha or grahya Gandhaka.

As per Rasa Taragini²¹, the best quality of Gandhaka should be clean without physical impurities (Nirmala), Lustrous, smooth on touch, its consistency like Navneeta, it should be coloured like tail feathers of parrot (Shukapiccha) or similar to turmeric (Rajanisamaprabha), these qualities are observed only in Amalasara Gandhaka so that should be taken for Rasa yoga preparation.

Blemishes of Gandhaka(Gandhaka Doshas)²²

Gandhaka has mainly two types of impurities

- Physical impurities like sand, small stones, etc. (Shilachurna)
- Arsenic, Haritala (Visha)

Hence Gandhaka Shodhana should be done prior to use.

Impure Sulphur Effects (Ashuddha Gandhaka sevana doshas)

As per Ayurveda Prakasha²³, if Ashuddha Gandhaka is taken internally it produces many undesirable effects in the body i.e. vitiation of Pitta and Rakta dosha, Jwara, Bhrama Charma roga, and destroys roopa, virya, bala, and shukra. It is mentioned in Rasa Ratna Samucchaya²⁴ that if ashuddha form is administered internally and apathya sevana continues, then it destroy the body like Halahala visha.

Purification (Sodhana) of Gandhaka

There are several methods for the Shodhana of Gandhaka as mentioned in different texts. The commonest method consist of heating upto melting stage with ghrita on fire and then pouring through a cloth into cow milk taken in a container and then washing it with hot water. The process

should be repeated for 3 to 7 times and every time fresh dugdha and ghrita should be used.

The process of Shodhana removes the physical, chemical impurities and reduces the toxic effects. Chemical impurities are eliminated through evaporated dissolution and blinding with ghrita milk, whereas physical impurities are removed by filtering through the cloth.

Deodorizing Sulphur(Gandhaka Gandhanashan Vidhi)

According to Rasendra chintamani²⁵, do powder of Gandhaka first, mix it with dugdha and heated till it becomes thick in consistency. Then add Suryavarta (Hrur or Tilparni) swarasa and heat again. Then this molten Gandhaka pour into Trifala kwath. Due to this procedure, Gandhaka loose its typical smell (Gandha).

This procedure has also been depicted by Ayurveda prakash, Rasa chandanshu, Rasendra purana, Br. Rasa raja sundara, Rasendra bhaskar, Rasa dhatu prakash, Rasa tarangini.

Sulphur Essence Extraction(Gandhaka Satvapataana)

As per Rasashastra classics, Gandhaka is already Satva like (i.e. Satvarupa) as that of Gairika

(mentioned by Acharaya Nandi). The supporting quotations are as follows-

- a. 'Gandhakancha swabhavena satvarupam' (Rasendra Mangala²⁶)
- b. 'Na Chasya Satva madadhyat satvarupo hi Gandhakah' (Anandakanda²⁷)
- c. 'Gandhako hi swabhavena Rasarupah swarupatah' (Rasarnava²⁸)
- d. 'Gauripushpa bhavastatha krimiharah satvatmako veeryakritah' (Rasa ratna samucchaya²⁹)

But Anandakanda³⁰ and Rasakamadhenu³¹ quoted methods of Gandhaka Satvapataana. By going through these methods, they seem to be the method of Gandhaka Shodhana. Nowadays Gandhaka Satvapataana has become obsolete.

Pharmacological and Therapeutic properties of Gandhaka

After delving through Rasashastra classics, the pharmacological and therapeutic properties of Gandhaka described the most, are enumerated as follows-

Table 4: Showing Properties

Rasa	Madhura, Katu, Tikta, Kashya
Guna	Sara, Snigdha
Virya	Ushna
Vipaka	Katu and / Madhura (Rasa prakash sudhakara ³²)
Doshakarma	Kapha vatahara, Pittavardhaka
Mahabhuta dominance	Agni, Prithvi
Karma	Vrishya, Deepana, Pachana, Rasayana, Shoshan, Vishaghna, Krimighna, Pleehagna, Balya, Aamdoshanashak, Divya Drishti Karaka.
Rogagnata	Kushtha, Kandu, Visarpa, Jwara, kasa, Shwasa, Dadru, Kshaya, Amajeerna, Garavisha.
Action on Dhatu	It acts on all Dhatus by its Rasayana property. It activates all Dhatwagnis.

Shuddha Gandhaka (1/2 Pala) has been extensively used as a ingredient in various formulations. It has also been extensively used singly with some Anupana or Sahapana e.g. as –

- i. Shuddha Gandhaka (1 Karsha) taken with Ghrita and Ushnodaka cures diseases caused by Kapha Dosha.³³
- ii. taken with Godugdha for 7 days cures Kandu, Pama, Vicharchika.³⁴

- iii. Shuddha Gandhaka (1 Nishka) taken with Godugdha enhances 'Shaurya & Vira bhava' if taken for 1 month and cures all diseases and makes Divya Drishti and Dirghayu if taken for 6 months.³⁵
- iv. Shuddha Gandhaka taken with Madhu and abstain salt and sour food makes 'Navinikarana of Sharir' i.e. it rejuvenates.³⁶
- v. Rasa Tarangini mentioned the 'Amayika prayoga' of Shuddha Gandhaka vividly in various diseases internally and externally with suitable Anupana or Sahapana.³⁷

That means, Shuddha Gandhaka has been singly employed by Rasacharyas to cure diseases and also for Rasayana purpose.

Dose of Gandhaka³⁸

1-8 Ratti (125 mg to 1 gram)

Vehicles (Anupana/ Sahapana)

Dugdha, Ghrita, Bhringaraja swarasa, Trifala kwath.

Management of Complications

Br. Rasa Raja Sundara³⁹ say that suppose the complications have arises by Gandhaka administration then Godugdha with Goghrita should be administered. Acharya Siddhinandana Mishra⁴⁰ suggests its matra as- 1 litre Dugdha + 100gm Ghrita in divided doses for two weeks.

Pathya

Jangala pashu-pakshi mamsa, Chhaga mamsa. Milk, Ghrita, Wheat, Rice, etc.

Apathya

Lavana, Amla, katu, Vidahi Padartha, Shaka, Pulses, Kshara, Kanji etc.

Toxicity

As far as its toxicity is concerned, sulphur is known to be of having low toxicity and poses very little if any risk to human health. Sulfa drugs, i.e. Sulfonamides can cause adverse drug reactions; the most common adverse reaction is ranging from various benign rashes to life threatening 'Stevens-Johnson Syndrome'. However incidence of this 'sulfa allergy' is approximately only 3%.

Discussion

From the time of Vedic era, there was no usage of sulphur internally or externally. Rudrayamala Tantra mentions its internal use for Rasayana purpose. But its 'Kala Nirdharana' remains to be debatable. In Samhita period, therapeutic application of it externally and internally for the diseases Kustha, Krimi, etc. gives indications that the Acharayas were well known of the therapeutic properties of Gandhaka.

According to Rasa literature, Gandhaka stands next to Parada in importance. It is an essential agent for the various processes of Parada such as Murchhana, Jarana etc. It is also considered important agent for Ranjana of Parada, Pakajarana of Bija and Bandhana of Parada.⁴¹ It is one of the most essential Bida dravya and also get mention in most of the Bida yoga^{42,43,44}.

In Rasashastra texts, white, red, yellow and black varieties of sulphur are found mentioned of which yellow (Amalasar) variety is recommended for medicinal use. Latest texts like Rasamritam and Rasa Tarangini described only one variety i.e. Peeta (Amalasar) Gandhaka.

As far as dose of Shuddha Gandhaka is concerned, except Rasa Tarangini, no any Rasashastra classics have mentioned its dose. But, while giving Gandhaka singly with some Anupana as Kalpa or Yoga, we have come across its doses mentioned in these Granthas as ½ Nishka, 1 Karsha or 1 Pala. Nowadays, dose of Shuddha Gandhaka mentioned by Rasa Tarangini⁴⁵. (i.e. 1 to 8 Ratti) seems to be appropriate. Like Gairika, Gandhaka is also 'Satva rupa'. But Anandakanda and Rasakamadhenu quoted methods of Gandhaka Satvapatana.

Mostly the media used for Gandhaka Shodhana, Anupana of Shuddha Gandhaka and dravya used for management of complications caused by Gandhaka Sevana quoted same as Godugdha and Goghrita. It shows that Rasacharyas wanted to slowdown its 'Agnikari' guna and also to reduce its toxic or adverse effects. It also throws light on Rasahastriya principles.

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