

## An analytical study of *Gairika* by two different methods of *shodhana*

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### Abstract:

**Introduction:** There are many more haematinic iron products on the market, but they are unable to address the nutritional iron deficiency of such a vast population for a variety of reasons, including high iron product costs, benefits exhibited only after prolonged administration (5 months), and medication side effects. *Gairika* is a natural hematite mineral that occurs in igneous and metamorphic rocks as an accessory mineral with other iron-titanium oxide minerals. There are very few studies to analyze the products of *Shodhana* of *Gairika*. In light of the aforementioned; attempt was made to evaluate the changes that occur following *Gairika's shodhana*, purified in two different ways.

**Materials and Methods:** *Shodhana* of *Gairika* was done in two methods (methods A and Method B). Method A employed *shodhana* with *Godugdha* while Method B involved *shodhana* with *goghru*. Organoleptic, and physiochemical characters of *Gairika* before and after *shodhana* procedures were studied. ICP-AES of three samples of *Gairika* was also studied.

**Results and Discussion:** There were changes noted in *gairika shodhana* by *godugdha* and *goghru* in studied parameters like pH, Mohs hardness, specific gravity and transparency. ICP-AES data showed mineral content within permissible limits.

**Conclusion:** *Gairika shodhana* is achievable with both *godugdha* and *goghru*. ICP AES data indicates trace metal levels within permitted limits, indicating that the medication's toxicity is minimal.

**Keywords:** *Gairika*, *Shodhana*, *Godugdha*, *Goghru*

### Introduction:

There are many more haematinic iron products on the market, but they are unable to address the nutritional iron deficiency of such a vast population for a variety of reasons, including high iron product costs, benefits exhibited only after prolonged administration (5 months), and medication side effects<sup>(1)</sup>. It exhibits positive results in conditions like piles, bleeding issues, ulcers, boils, urticaria, vomiting, hiccups, and more. It is used as an ingredient in some compound preparations that contain numerous mineral drugs rather than as a standalone medication. Constipation is a main and widespread adverse effect of all modern haematinic medications. Consumers have shifted their focus to safe and effective therapy as a result of all of these hurdles to current haematinic consumption. *Ayurveda* has given a very safe and effective treatment for anaemia since ancient times. Iron compounds such as *Mandura*, *Lauha*, *Makshika*, and *Kasisa* have been used in *Ayurveda* to cure anaemia<sup>(2)</sup>. Several studies on *Lauha*, *Madura*, *Kasisa*, and *Suvarnamakshika* for their *Pandu* impact have been conducted, and the results reveal that these minerals functioned well as an *Ayurvedic* haematinic in iron deficiency anaemia without generating animal toxicity. Some trials compared *Mandura* and *Gairika* in the treatment of iron deficiency anaemia, with *Gairika* showing haematinic characteristics. *Gairika* is a natural hematite mineral that occurs in igneous and metamorphic

rocks as an accessory mineral with other iron-titanium oxide minerals<sup>(3)</sup>. The mineral magnetite is associated to *Gairika*. It contains trace levels of titanium and magnesium on occasion. *Gairika* is found in highly ferruginous rocks as a result of the alteration of other iron minerals or as weathered residual amounts. *Gairika* is rich in ferrous iron, which is the most absorbable of all iron types. Internal administration of *Gairika*, on the other hand, is still possible using a simple *shodhana* method. *Gairika* is also more commonly available than other *Lauha*-containing minerals, as well as being more cost-effective for the general public. Although *Rasashastra* literature describe various different *Shodhana* of *Gairika* procedures, the *Ghratabharjana* and *Godugdha bhavana* methods were selected for this study. These techniques are mentioned by the majority of Acharyas, and they are also easy to carry out. *Gairika* was purified with the help of *Godugdha* and *Goghru*. The aim of this study was to evaluate the changes that occur following *Gairika's shodhana*, purified in two different methods.

*Rasayana*, *Yogavahi*, and *Sanskaranuvartana* are *Goghru* attributes that aid in the pacification of *Pitta dosha* and the entry into *Sukshma Srotasa*, thus supporting *Panduroga's Sampraptivighatana*. Constipation caused by Iron preparation consumption, which is most common in all other Iron preparation consumption, is relieved by the smooth coating of *Ghruta* on *Gairika* obtained as a result of *shodhana* procedure<sup>(4)</sup>.

*Godugdha*, on the other hand, was the second purification medium. Some of *Godugdha's* qualities mentioned in the classics include *Rasayana*, *Balya*, Nutritious, Mild Purgative for *Pitta* constitution people, and so on. The haemopoitic and immunological systems of the body are aided by *Rasayana* medicine. It is possible to cover nutritional iron deficiency anaemia by strengthening the haemopoitic system and using *Godugdha* as a triturating agent for purification of *Gairika*.

The SOP of Shodhana of *Gairika* was not studied till now. In light of the aforementioned; a small attempt was made to evaluate the changes that occur following *Gairika's shodhana*, purified in two different ways.

#### Materials and methods:

A] Collection of Raw materials-

1) *Gairika*- The key raw material of this research work was *Gairika* and it was collected from online purchase from Dev Pharmacy.

2) *Goghrita* – For purification of *Gairika*, *Goghrita* was required. It was collected from local market having ISI certified brand – Godrej Company

3) *Godugdha*- Fresh cow milk was collected daily from local dairy.

Characteristics of raw material used -The raw material *gairika* had bright red powdered form. The *Goghrita* had granular consistency and had yellowish tinge.

*Shodhana* of *Gairika* was done in two methods (methods A and Method B).

Method A employed *shodhana* with *Godugdha* while Method B involved *shodhana* with *goghrita*.

Ingredients: Raw *Gairika* 100 grams

Accessory drugs: *Goghrita* 25 ml ( 1/4<sup>th</sup> of *Gairika* ) and *Godugdha*-200 ml

Equipment : Heating device (Gas burner), Iron pan, Spatula, Earthen saucer

**Procedure for Method A:** After adding *Godugdha* to the raw material *Gairika* powder, *Gairika shodhana* was done by grinding in *khalvayantra*. It underwent physical and chemical modifications, and *ayurvedic* tests were used to establish its standard. (Table 1)

**Procedure for Method B:** After adding *Goghrita* to the raw material, *Gairika Shodhana* was done by roasting it in an iron pan at high heat on a gas burner. Physical and chemical changes in procedure B were also observed, and standard *ayurvedic* tests have been used. (Table 2)

Details are as mentioned in (Table 1, 2, 3)

**Table 1: Shodhana of Gairika with Godugdha (Method A)**

Initial Wt. (gm) Before shodhan	Final Wt. (gm) After shodhan	Godugdha (ml)	Duration (hrs)
100	98	200	14

**Table 2: Shodhana of Gairika with Goghrita (Method B)**

Initial Wt. (gm) Before shodhan	Final Wt. (gm) After shodhan	Goghrita (ml)	Duration (hrs)
100	122	25	14

**Table 3: Organoleptic, and physiochemical characters of Gairika before and after shodhana procedures**

Variable	Before shodhana	After shodhana with Godugdha Method A	After shodhana with Goghrita Method B	
Organoleptic characters	Colour	Brick red	Red colour	Dark Brick red
	Odour	earthy	Specific (milky)	Earthy
	Texture	rough, stony	smooth, powder	Very smooth
	Taste	<i>kashaya</i>	<i>kashaya</i> slightly <i>madhura</i>	<i>Kashaya madhura</i>
Physiochemical characteristics	PH	5.94	5.17 ( 80 %w/v)	5.76 ( 33% w/v)
	Specific gravity	2.77	2.74	2.72
	Mohs hardness	5.8	5.3	5.2
	Transparency	Opaque	Opaque	Opaque

#### w/v ( weight by volume in percentage for solution

There is growing concern of toxic metal compounds in CAM system which is often poorly regulated. More and more case reports of toxic metal poisoning are available and showing very heavy toxic metal level ( above permissible limit) in many *ayurvedic* product. In this quest, it is responsibility of *ayurvedic* researchers to assess the metal composition in our products and give a disclaimer as good practise guidelines. All the samples were analyzed for mineral content by Inductively Coupled Plasma Atomic Emission Spectrometer (ICP-AES). The trace metal composition of *ashodhit gairika*, *godugdha shodhit gairika* and *Goghrit shodhit gairika* are as shown in (Table 4) and were way below daily toxic consumption limit.

Table 4-showing analysis of ICP-AES of three samples of *Gairika* (1 mg each)

Sr no	sample	Cd	Cu	Fe	Pb	As	Hg
1	ashodhit	ND	0.0017	27.286	0.0053	ND	ND
2	<i>Godugdha</i> shodhit	ND	0.0027	18.194	0.0054	ND	0.0216
3	Ghrit bharjit	ND	0.0032	22.432	0.0048	ND	ND

ND- Means less than 0.01 ppm

## Discussion

Already 200,000 to 100,000 years ago Neanderthal people in Europe as well as early modern humans in Africa painted their body with red ochre mixed with fat. They did it long before modern man developed significant artistic skills and interest in sophisticated rituals. Ochre, iron oxide, under sunlight on the moist skin, generates aggressive chemicals. They transform body smell into odourless carbon dioxide and sterilize the skin from bacteria. A scentless skin became a big advantage because primitive hunters had to approach their shy game at close distance. In addition the ochre treatment helped to control infections and disease from exposure to wild animals and their remains.<sup>(5)</sup>

*Gairika* is linked to the mineral magnetite. Minor amounts of titanium and magnesium are occasionally found in it. *Gairika* is found as a by-product of the alteration of other iron minerals or as weathered residual quantities in highly ferruginous rocks. It's usually found in combination with clay and other contaminants, because of the *bharjan* process unwanted part evaporates.<sup>(6)</sup>

There are different hypothesis projected for *gairika shodhana*. The first one describes raw *gairika*, the presence of water and oxygen molecule increases the chances to have free ferrous irons. The body must protect itself from free iron which is highly toxic and participates in chemical reactions that generates free radicals. So when red ochre is roasted with ghee, ferrous iron is converted to ferric form. These chemical changes might take place in shodhan process by both methods of *shodhana*. Fe<sup>+++</sup> ions are absorbed easily and carried in the plasma by protein transferring. So *shodhana* process may increase the absorption rate in body.<sup>(7)</sup>

Because of these impurities, purification processes are primarily designed to reduce toxicity to a body-tolerated level and to reduce toxic constituents to some extent, either by potentiating their chemical transformation to nontoxic or relatively less toxic substances or by improving their biological efficacy.<sup>(8)</sup>

There is data about *shodhan* of *gairika* with x ray diffraction which showed the change in basic drug in oxide forms, and nanoparticle conversion. It is assumed that nanoparticles are

easier to absorb, but clinical data about nanoparticle effectiveness is very limited.

The primary objective of this research was *gairika shodhan* by two methods and its analytical study, but the percentage content of heavy metals of *ashodhit* and *shodhit gairika* was also focussed as secondary objective. The things we observed was that the baseline content of heavy metals was also below permissible limits in *ashodhit gairika* and after *shodhana*. As *Ayurvedic* medicines are recently been criticized for high amount of metal levels (above permissible daily limit) and it is important to assess ICP AES to show it that the final product was within permissible level for heavy metals. Our data shows that all metal quantity in *ashodhit* as well as *shodhit gairika* is well below permissible limit, which is important disclaimer to be given to the patient before administering the drug.

## Conclusion:

*Gairika* is a naturally occurring mineral that is thus less expensive than haematitic. *Gairika shodhana* is achievable with both *godugdha* and *goghruata*. ICP AES data indicates trace metal levels within permitted limits, indicating that the medication's toxicity is minimal. To fully understand the mechanism of action, potency, and efficacy of this *ayurvedic* medication, more patient-centered research is required.

**Conflict of Interest:** Nil

**Source of Support:** Nil

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