

## REVIEW ARTICLE

# Iron in Ayurveda: A Review through Major Ayurvedic *Samhitas*

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### ABSTRACT

This paper intends to comprehensively present the major uses of the metal iron in the Ayurvedic classical texts. Ayurvedic classics such as *Brihatrayī- Caraka Samhitā*, *Susruta Samhita*, and *Aṣṭanga Samgraha* dictate fine use of many herbs with iron in specified diseases, respectively. Different methods of preparations are also employed in Ayurveda to make the metal iron easy to administrate, palatable, and enhance to the absorption in human body. *Ayaskriti* is a primitive invention of internal administration of iron. References are available in *Samhitās* about the uses of iron in powdered form called as *ayaskriti*. However, in Rasa Shastra, detailed descriptions are available about the preparation and therapeutic uses of *Loha Bhasma* (calcined iron). To prepare *Loha Bhasma* (calcined iron), a series of pharmaceutical procedures are explained such as *śothana* (detox-purification), *māraṇa* (incineration), and *amṛtikaraṇa*, so that its therapeutic benefits can be achieved in various disease conditions. The maximum formulations of *Lauha Bhasmā* are found in *Jwara* (fever), *Pāṇḍu* (anemia), *Aṛśa* (piles), *Śoṭha* (inflammatory disorders), and *Prameha* (diabetes mellitus). Iron is a unique metal where alcoholic preparation is performed (as *lohāśava*) in Ayurveda. Many references are available on *Loha* in Ayurvedic *Samhitās*.

## 1. INTRODUCTION

Iron is one among the major metals present in the earth's crust and is essential for sound sustenance of human body. *Loha*, the term used for iron, is one of the important metals in Ayurvedic classics known for its hardness. Its deficiency leads to various health ailments. Contemporary medicine advises iron supplements in iron deficiency anemia. Ayurvedic classics also quote significant information about the internal administration of iron. It is interesting that iron preparations are used in Ayurveda in different medical conditions apart from anemia (*Pāṇḍu*). In Rig-Veda, the word *ayas*, which appears in numerous hymns, clearly refers to iron.<sup>[1]</sup> Iron, steel, and wood were used to make all of the weapons and chariots used in combat. In Atharvaveda, there are many references which quote *loha* (iron) as *śarīra ghaṭaka* (essential element for blood production).<sup>[1]</sup> In Manusmṛiti, there is a reference to *loha*. There are six *dhātus* (metal), according to *Yājñavalkya Smṛti*. *Ayas* is one of them, and it is used to create idols.<sup>[3]</sup> In *purāna* period, it was not utilized for medicine, but it was frequently used in the creation of weapons, idols, and other objects.<sup>[1]</sup>

Different methods of preparations are employed in Ayurveda to make Iron easy to administer, palatable and enhance to the absorption of iron in human body. In Rasa Shastra, detailed descriptions are available about the preparation of *Loha Bhasma* (calcined iron) and their therapeutic uses.<sup>[2]</sup> To prepare *Loha Bhasma* (calcined iron), a series of pharmaceutical procedures are explained such as *śothana* (detox-purification), *māraṇa* (incineration), *amṛtikaraṇa*, so that its therapeutic benefits can be achieved in various disease conditions. The iron containing compounds such as, *Kāśīsa* (ferrous sulfate), *Māḥṣika* (iron pyrite), and *Gairika* (Ochre) ( $Fe_2O_3$ ) are also used both externally and internally.

In *Samhitās*, references are available about the uses of *loha* (iron) in powdered form called as *ayaskriti*. *Ayaskriti* is a primitive invention of internal use of iron which is modified to *bhasma* (powder). It is believed that *Lauha Bhasma* (calcined iron) is better than *ayaskriti*. Iron is a distinct metal where alcoholic preparation is presumed (as *Lohāśava*) in Ayurveda. As per the Ayurvedic pharmacopeia more than 80,000 formulations are found for different diseases and clinical conditions and for the wellbeing of the humans.<sup>[4]</sup> The *loha bhasma* (Calcined iron) are biologically produced nano particles and are taken along with milk, butter, honey or ghee to make these elements easily assimilable, eliminating their harmful effect and enhancing their bio- compatibility.<sup>[4]</sup> This study is an attempt to know the properties,

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action and different indications of iron and iron containing compounds from the major three classical texts of Ayurveda.

## 2. MATERIALS AND METHODS

Screening of Ayurvedic *Samhitās* for references related to *loha gunā* (properties of iron), *loha kalpā* (Formulations of iron), etc. Published articles are also used to acquire material on the topic.

## 3. DISCUSSION

### 3.1. Loha in *Samhitās*<sup>[5,6-10]</sup>

#### 3.1.1. Caraka *Samhitā*

*Caraka Samhitā* mentions *pañcaloha* (five metals) in the 1<sup>st</sup> chapter of *Sūtra sthāna* while describing *pārthiva* or *bhauma* dravyas (earthly substances). *Cakrapānidatta* clarifies *pañcaloha* as *tāmra* (copper), *rajatha* (silver), *trapu* (tin), *sīsa* (lead), and *kṛṣṇaloha* (iron).

There is no reference available in *Nidāna sthāna*. *Acārya Caraka* had mentioned the procedure of *ayaskriti* preparation in first chapter of *Cikitsa sthāna* in the name *loha rasāyana*. In that context, the technique of *śothana* (*nirvapa*) then pounding it to fine powder and keeping it for 1 year after mixing with *āmālaka* (*Phyllanthus emblica* Linn.) and *madhu* (honey) in a pot surrounded by paddy indicates the initial concept of compound conversion process, from harmful to beneficial compound of same material without the involvement of direct fire with the presence of reducing agents and antioxidants.<sup>[11]</sup> *Caraka Samhitā* describes another *ayaskriti*, which converts thin leaves of metal into fine absorbable form in *udara chikitsa* chapter. *Ayaskriti* is *rasāyanoktha loha prayoga* (rejuvenator) as per Ayurveda *Deepika vyākhyā*. *Rasāyana pāda* of *Caraka Samhitā* describes *Brahma rasāyana*, *Louhādi rasāyana*, *Triphalā rasāyana*, *Śilājatu rasāyana*, and *Indrokta rasāyana*, which contains iron in different forms such as *cūrṇa*, *vatī*, *avaleha*, *varti*, and *āsavarīshita*. Most of the preparations use iron in *bhasma* form. *Triphala rasāyana*, *Yogarāja*, *Manasila tailam*, and a *Kshāra* (alkali) preparation mentioned in *Grahani Dosha Chikitsa* uses *loha bhājana* (iron pot) for the preparation. *Śārīra stāna* mentions iron is used for the preparation of *tīkshna sūci*, *nābhi kartana śāstra* and for *śalāka nirmāna*. *Mandūra* (red iron oxide) is a form of iron and has been used for a wide range of therapeutic procedures. It is the drug of choice in cases of anemia (*pāndu*) and *Caraka* refers to a number of preparations [Table 1].

#### 3.1.2. *Aṣṭanga Saṃgraha*

In *Aṣṭanga Saṃgraha*, for the first time, it was explained that *kṛṣṇāyas* (iron) is different from *tīkshna loha*. *Kāntayasa* (magnetite) is mentioned along with precious stones. *Kānta loha* (Magnetite) is also mentioned as one of the *anu yantra*. Using *kantayasa* (magnetite), the foreign body (arrow head) which is without earlike projections and which has created a wide opening in the body and lodged straight can be removed. *Aṣṭanga Saṃgraha* explains properties of *kṛṣṇaloha* in *dvivithoushadha viññāneeya adhyāya* of *Sūtra sthāna*. As per the reference, it is having *kashāya* (astringent), *swādu* (sweet), *tikta rasa* (bitter), and *sīta vīrya* (cold in potency). In the preparation of *Yogarāja avaleha* (*bhallātaka* as main ingredient), *lohakanta* is used as one of the *prakṣepaka*. *Ayaskriti*, *Maricādi lepa*, and *Kanakakṣīryādi taila* are major formulations which contain iron as an ingredient and are mentioned in *Kuṣṭha cikitsa adhyāya* [Table 2].

#### 3.1.3. *Susṛuta Samhitā*

*Kāntaloha* (Magnetite) was first mentioned in *Sūtra sthāna* of *Susṛuta Samhitā*, under *upa yantra varga* (accessory instruments). *Susṛuta Samhitā* elaborately mentioned about the use of iron in *Mahākūṣṭha*

*chikitsa adhyāyam*. *Ayaskriti* is the term used to denote metallic preparations. Three types of *Ayaskriti* are mentioned – *Ayaskriti*, *Aushadhi ayaskṛti*, and *Mahaushadhi Ayaskriti*. Among this first preparation is in powder form, next is in paste form and remaining is in *sandhāna* (alcoholic) form. *Aushadhi Ayaskriti* is said to be preserved in an iron container. For the preparation of *Mahaushadha Ayaskriti*, putting decoction of *sālasārādi* drugs in a tub made of *palāśa* (*Butea monosperma* L. Kutza.) wood heated iron balls should be dipped and cooled therein, then it should be put in a purified jar adding parts of the powder of *pippalyadi* drugs, honey, jaggery and kept well protected for a month or a fortnight. Other preparations such as *Nīla ghṛita*, *Vidanga tandula rasāyana*, and *Vibhūtaka taila* mentioned in *Kuṣṭha cikitsa*, *Sarvarogopahata rasāyana adhyāya*, and *Misraka chikitsa adhyāya*, respectively. Furthermore, *Navāyasa louha* and *Louhārīshita* are explained in *prameha pidaka chikitsa* [Table 3].

#### 3.1.4. *Aṣṭanga hṛdaya*

*Loha bhasma* said as *agrya* (best) in *pāndu* (anemia) is described in *Vājīkarana adhyāya* of *Uttarastāna*. While describing the *rasa skandhas* (six tastes), *Aṣṭanga hṛdaya* mentioned iron in *Tikta skandhas* (group of bitter drugs). In *kshāra* (alkali) preparation, iron vessel is advised to use universally. *Sandhana* type of *Ayaskriti* preparation is described in *Prameha chikitsādhikara* of *Aṣṭanga hṛdaya*. However, in *Aṣṭanga Saṃgraha* it is mentioned in *Kuṣṭha cikitsa adhyāyam*. Both the preparations are similar in terms of drugs. As per *Aṣṭanga hṛdaya* twenty *pala* each of the drugs of *asanādigana* are boiled in two *vaha* of water, and decoction reduced to its quarter. Two hundred *pala* (9600 g) of *guda* (Jaggery) half *ādhaka* (1536 ml) of honey and paste of the drugs of *vatsakādi gana*, each one *pala* (48 g) are added to it and poured into a pot smeared inside with ghee, honey and powder of *pippali* (*Piper longum* Linn.) the pot is then given a thick coating of *jatu* (lac) outside and placed inside a heap of *yava* (*Hordeum vulgare* Linn.). Thin sheets of *Tikshna loha* are made red hot with the embers of *khadira* wood and immersed in the liquid several times till the iron gets depleted completely in the liquid. Then the mouth of the pot is sealed and kept undisturbed for a fortnight. *Aṣṭanga Saṃgraha* said to kept it sealed for 1 month. *Cūrṇa ayaskriti* preparation is mentioned in *kaphaja udara chikitsa*. Most of the iron containing formulations are in *Rasāyana vidhi adhyāya* of *Aṣṭanga hṛdaya*. Paste of *pippali* (*Piper longum* Linn.) smeared to the interior of an iron vessel, which is filled with water and kept overnight becomes a *rasāyana*. Iron vessel is recommended for use in the preparation of *Sundi rasayana*, *Silajatu rasayana*, and *Narasimha ghṛita*. Iron is used in different formulations and preparatory procedures of eye diseases. *Taila*, *varti*, *anjana*, and *mashi kalpana* having iron are also described. Iron vessel is used for collyrium storage. *Kaseesa* or ferrous sulfate is used in *Maricādi lepa* and *Kanakakṣheeryadi tailam* mentioned in *Kuṣṭha cikitsa* of *Aṣṭanga hṛdaya* and is used as external application. For therapeutic purpose, *Bringāraja* fried in oil in an iron vessel should be consumed in *switra*. In *Vatashonita* treatment, prepared paste of the drugs is advised to apply over iron vessel in the morning and consumed in the midday. *Jivantī taila* is advised to prepare in iron vessel and also allowed to remain store in the iron vessel itself for 1 month for the treatment of nasal medication [Table 4].

## 4. CONCLUSION

Iron is used as medicine from the Vedic period itself. It is considered as an essential nutrient for our body during growth and is necessary for everyday living. Therapeutic usage of iron is mostly restricted in IDA as per the modern system of medicine. Mineral resource are one of the natural resource used in Ayurvedic preparations from the

time of *Acārya Caraka*. Ayurveda uses iron with other plant origin drugs. Such polyherbal preparation helps to reduce the side effects and also to increase the bioavailability. Ayurvedic texts involve stringent purification steps for loha preparations. Iron is processed in cow's urine and extensively used therapeutically as *Ayaskriti* or as *Lauha Rasāyana* before the evolution of *Rasashastra* as *Ayaskriti*. The iron containing mineral are used internally from 2<sup>nd</sup> century and it is evident from the preparation of *Navayasa Lauha* and *Lauha Rasāyana* in *Caraka Samhita*. Most of the iron containing preparation explained in *samhita* uses iron in the form of *loha bhasmā*. Only few references are there using *loha bhājana* for the preparation. The maximum formulations of *Lauha Bhasmā* is found in *Rasāyana* (rejuvenative), *Jwara* (fever), *Pāṇḍu* (anemia), *Aṛśa* (piles), *Sotha* (inflammatory disorders), and *Prameha* (diabetes mellitus). The external uses of iron are also found in oil preparation (*Taila Kalpanā*) and Varti preparations (Medicated Stick for Ophthalmic uses). The iron containing compounds such as *Kāsisa* (Ferrous sulfate), *Māksika* (Iron pyrite), and *Gairika* (Ochre) (Fe<sub>2</sub>O<sub>3</sub>) are also used both externally and internally in Ayurvedic system of medicine. As per API, *Louha kalpas* are the unique herbo-mineral formulations where iron is used as a major ingredient. From among all the medicinal preparations, *Loha kalpa* is said to be excellent.

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All the authors contributed equally in design and execution of the article.

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This study not required ethical clearance as it is case study.

## 9. CONFLICTS OF INTEREST

Nil.

## 10. DATA AVAILABILITY

This is an original manuscript and all data are available for only review purposes from principal investigators.

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**Table 1:** Iron containing formulations in *Caraka Samhitā*<sup>[5,7]</sup>

Chapter name	Reference	Form of iron present	Name of the formulation	Other therapeutic uses
1. Rasāyana pāda	C.Ci. 1-1/58	Kalayasa churnam	Brahma rasāyana 2	Ayushyam, balyam
2. Rasāyana pāda	C.Ci. 1-3/15-23	Tikshna ayasa patra	Louhadi rasāyana	Dhi, vaksidhi
3. Rasāyana pāda	C.Ci. 1-3/43-44	Ayasa patra	Traiphala rasāyana 2	Jara, ruja, varsha satāyu
4. Rasāyana pāda	C.Ci. 1-3/52	Ayasa	Silājathu rasāyana	Jara, medha smriti karam
5. Rasāyana pāda	C.Ci. 1-4/13-26	Ayasa	Indrokta rasāyana	Vrishyam, ayushyam, indriya balapradam
6. Kuṣṭha chikitsa	C.Ci. 7/73-75	Loha bhasma, loha pātra	Madhwasava	Kushta, kilasa
7. Kuṣṭha chikitsa	C.Ci. 7/130	Loha	As lepana	Pitta kapha kuṣṭha
8. Kuṣṭha chikitsa	C.Ci. 7/171	Loha bhasma	Kilāsa nāsaka yoga	Kilāsa
9. Swayathu chikitsa	C.Ci. 12/34-38	Loha	Punarnavadyarishta	Swayadi
10. Udara chikitsa	C.Ci. 13/72-73	Churna ayaskriti	Ayaskriti	Kaphodaram
11. Grahani dosha cikitsa	C.Ci. 15/186,187	Ayasa bhājana	Kshāra preparation	Grahani, sodha, arśa, Pāṇḍu
12. Pāṇḍu roga chikitsa	C.Ci. 16/70,71	Ayoraja	Navayasa chūrnam	Pāṇḍu, kamala, kuṣṭha, arśa
13. Pāṇḍu roga chikitsa	C.Ci. 16/72-77	Māksika, mandūra	Mandūra vataka	Pandu, sophā, urustamba, arsa, kamala, prameha, pliha
14. Pāṇḍu roga chikitsa	C.Ci. 16/78	Mandūra (ayomala)	Tāpyadi yoga	Pandu
15. Pāṇḍu roga chikitsa	C.Ci. 16/80-86	Loharaja, Māksika, loha bhājana,	Yogarāja	Pāṇḍu, visha, apasmara, kamala etc.
16. Pāṇḍu roga chikitsa	C.Ci. 16/95	Mandura	Punarnava mandura	Pandu, pliha, arsa, vishama jwara, swayadu, grahani, kushta, krimi
17. Pāṇḍu roga chikitsa	C.Ci. 16/103	Mandura	Mandura vataka	Pandu, pliha, grahani, arsa
18. Trimarmiya	C.Ci. 26/63	Loha bhasma	Punarnavadi yoga	Asmari, sarkara
19. Trimarmiya	C.Ci. 26/254	Loha bhasma	Drishtiprada varti	Drishtipradam
20. Trimarmiya	C.Ci. 26/263-275	Lohapatra	Mahanila tailam	Cakshushyam, palitha

**Table 2:** Iron containing formulations in *Aṣṭanga Saṃgraha*<sup>[8]</sup>

Chapter name	Reference	Form of iron present	Name of the formulation	Other therapeutic uses
1. Kuṣṭha chikitsa	AS.Ci. 21/14	Loharaja, Lohakanta as praksepa dravya	Yogaraja avaleha	Kusta, swasa, agnisada, aruci, kasa, yakshma, gulma, prameha etc.
2. Kuṣṭha chikitsa	AS.Ci. 21/21	Ayapanda	Asanadyaṣkruti	Kuṣṭha
3. Kuṣṭha chikitsa	AS.Ci. 21/60-62	Kaseesa	Maricadi lepa	Sidhma kuṣṭha m, kilasa
4. Kuṣṭha chikitsa	AS.Ci. 21/63-66	Kaseesa	Kanakaksheeryadi tailam	Vata kapha kuṣṭha, mandala, dadru, koda, krimi, pama, vicarcika
5. Rasāyana vidhi	AS. U.49/50,51	Ayasa pātra	Traiphala Rasāyana	Rasāyana
6. Rasāyana vidhi	AS. U.49/53	Ayasa pātra, ayas	Loha drava rasāyana	Rasāyana

**Table 3:** Iron containing formulations in *Susruta Samhitā*<sup>[9]</sup>

Chapter name	References	Form of iron present	Name of the formulation	Other therapeutic uses
1. Kuṣṭha chikitsa	Su.Ci. 9/29-33	Loharaja	Nīla ghṛita	Kuṣṭha
2. Mahā kuṣṭha chikitsa	Su.Ci. 10/11	Ayaṣkruti in Churna form	Ayaṣkruti	Kuṣṭha, prameha, swayadu, Pāṇḍu, unmada, apasmara
3. Mahā kuṣṭha chikitsa	Su.Ci. 10/12	Ayaṣkruti in avaleha form	Ayaṣkruti	Kuṣṭha, prameha, sthoulya, sophā, rajayakshma
4. Mahā kuṣṭha chikitsa	Su.Ci. 10/12	Ayaṣkruti in sandhana form	Ayaṣkruti	Kuṣṭha, prameha, sthoulya, sophā, rajayakshma
5. Prameha pidaka chikitsa	Su.Ci. 12/11	Louhabhasmā	Navayasa louha	Aṛśa s, sophā, Pāṇḍu, kuṣṭha, kasa, swasa, prameha
6. Prameha pidaka chikitsa	Su.Ci. 12/12-19	Tikshna loha patras	Loharishta	Sophā, gulma, prameha, Pāṇḍu, pleehodara, vishamajwara, abhishyandi
7. Misraka chikitsa	Su.Ci. 25/32-37	Loha raja, loha patra	Vibhūthaka taila	Khalati, jara, vali
8. Sarvopaghāta samaneeyam rasāyanam	Su.Ci. 27/8	Ayakumba	Vidanga tandula Rasāyana	Aṛśa, krimi, grahani

**Table 4:** Iron containing formulations in *Aṣṭanga hṛdaya*<sup>[10]</sup>

Chapter name	Reference	Form of iron present	Name of the formulation	Other therapeutic uses
1. Prameha chikitsa	Ah.Chi. 12/29–32	Tikshna loha patra	Ayaṣṅṛti	Prameha
2. Switra krimi chikitsa	Ah.chi. 20/8	Loha patra	A taila preparation	Switra
3. Vartmaroga pratisheda	Ah.U 9/32,33	Loha raja	A varti preparation	Kukunaka
4. Sandhi sitāsita roga pradisheda	Ah.U 11/4,5	Loha churna	Anjana preparation	Pūyalasa
5. Timira pradisheda	Ah.U 13/51–53	Loha patra	Taila preparation for nasya	Vata timira
6. Timira pradisheda	Ah.U.13/71	Loha raja	Kokila varti	Kaphaja timira
7. Sarvakshiroga pratisheda	Ah.U.16/30	Loha patra	Mashi Kalpana	Sushkashi paka
8. Sarvakshiroga pratisheda	Ah.U 16/40–42	Loha raja	Anjana preparation	Sasopha akshipaka, alpa sopha
9. Rasāyana vidhi	Ah.U.39/42–43	Loha Bhasmā	Triphala Rasāyana	Sarvarogaharam, Rasāyana, smṛuti budhi pradam
10. Rasāyana vidhi	Ah.U.39/103	Ayo patra	Pippali prayogam	Rasāyana
11. Rasāyana vidhi	Ah.U.39/107	Loha churna	Somaraji Rasāyana	Rasāyana
12. Rasāyana vidhi	Ah.U.39/140–141	Ayo Bhasmā	Silajathu Rasāyana	Rasāyana
13. Rasāyana vidhi	Ah.U.39/149	Loha renu	Dhatri prabhṛuti sevanam	Tarunya lavanyakaram
14. Rasāyana vidhi	Ah.U.39/150	Loha raja	Valaka lohadi churna	Balyam, Krishna kesa
15. Rasāyana vidhi	Ah.U.39/161	Loha raja	Silajathu prayoga	Dourbalyam
16. Rasāyana vidhi	Ah.U.39/169–173	Loha patra	Narasimha Rasāyana	Keshyam