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Iron in Ayurvedic Medicine

Ashok Kumar Panda[*1], Sangram Mishra[2] and Susanta Kumara Mohapatra[3]

[*1]Corresponding author, Research Officer Incharge, Ayurveda Regional Research Institute, Tadong, Gangtok, Sikkim -737 102. Email-rrigtk @ yahoo.co.in
[2]Senior Research Fellow (Ay), Ayurveda Regional Research Institute, Tadong, Gangtok, Sikkim-737102.
[3] Lecturer in Rasashastra, Rajiv Gandhi Medical College & Hospital, Durg, Chhatisgarh

Abstract

Iron is used in *Ayurvedic, Siddha* and *Unani* system of medicine. *Ayaskruti* and *Lauha Rasayana* are the primitive uses of iron and latter refined to biologically produced nano particles as *Iron bhasma*. The physiology, biochemistry and pharmacological uses of iron are reviewed. *Makhika* (*Iron pyrite*), *Kasisa* (*Ferrous sulphate*), *Gairika* (*Ochre*) are the iron containing compounds are extensively used in Ayurveda. The properties and action of iron and iron containing compounds are described. The indications of iron supplement and drug administrative mode of iron and iron containing minerals are also reviewed. Total 293 formulations contains iron nano particles (*Lauha Bhasma*) are elucidated and 85 formulations are found that containing iron compounds in 55 diseases. The maximum formulations of *Lauha Bhasma* is found in *Jvara* (Fever), *Pandu* (Anemia), *Arsha* (Piles), *Sotha* (Inflammatory disorders) etc. The maximum iron containing formulations are found in form of Vati (tablet form). Iron containing formulations are often associated with *Amalaki* (*Emblica officinalis*) a rich source of ascorbic acid to enhance the absoption.

Keywords: Lauha bhasma, ayaskruti, iron, anemia, bhaisajya ratnavali, vati, anjana.

Introduction

Iron is used as the means of life and in the protection of self as utensils, ornaments, instruments for cultivation and weapons from the human existence in the earth as per the *Greek* and *Roman* mythology[1]. The word iron is derived from the Latin word *ferrum*. A period of time is diverted as *Iron Age* after the age of Bronze. Iron Age is considered with the begin of 12th century BC. in the ancient Near East, ancient Iran, ancient India (with the post-Rigvedic Vedic civilization), and ancient Greece (with the Greek Dark Ages)[2]. Iron helps keep plants and animals alive. Iron plays a role in the creation of chlorophyll in plants and is an essential part of hemoglobin, the substance that carries oxygen within red blood cells. It also helps cells oxidize food by iron-containing enzymes called cytochromes and an essential constituent of iron binding proteins. Iron is found in all living cells and total body content is about 5 gm (One tea spoon full)[3]. The Siddha, Unani and Ayurvedic system of medicine have been using iron in different diseases from 2nd century BC. Iron supplements are used in all chronic diseases and iron deficiency anemia as diagnosed by modern medicine. This study is an attempt to know the properties, action and different indications of iron and iron containing compounds

from the most popular compendium of medicine i.e. *Bhaisajya Ratnabali*.

Milestone of modern understanding of iron in Human health and disease

The first observations on the iron in health is found from a *Persian* physician Melampus (4000 BC), who gave iron supplements to sailors to compensate for iron lost from bleeding during battles. Therapeutic uses of iron is also found in the period of *Hippocrates* (460-377 BC) who is referred as father of modern medicine, stated that, "those diseases which medicines do not cure, iron cures, those which iron cannot cure fire cures and those which fire cannot cures are to be reckoned wholly incurable". Seville is the physician who used iron orally in 16th century[4]. *Lemery* and *Geoffry*, in 1713 provided more direct evidence of the relationship by showing that iron was present in blood (ash).The history of iron in human health is proved experimentally from iron deprivation by *Colette* (1897) in Dogs, were the first to show that dietary deficiency and/or loss of iron from the body causes a specific disease (Iron deficiency anemia). Dr Stephen Curry proved the presence of iron in the Haemoglobin molecules in 1840[5]. In 1958, Professor Clem Finch published the first two articles on factors influencing dietary iron absorption in man and was conducting studies of iron kinetics, which eventually led to the development of a ferrokinetic method for evaluating erythroid marrow function in man[6].

Iron is the most highly utilized transition metal in human health. The widespread problem of iron deficiency Anaemia in developing countries and in developed countries and in defined segment of more advanced societies elevated iron's status as an empowering nutrient. Even in USA one in ten women is anemic. The existence of a more active and dynamic iron withholding defense mechanism became evident through scientific research. In 1932 Locke and co-workers described a profound drop in serum iron concentration experienced in patients with infection, cancer and inflammatory disease.[7]

On account of its great affinity for oxygen, iron plays an important part in the organic world and stands in very close relation to the fundamental process of change of the matter and metabolism. Iron also generates magnetic blood current in the nerve spirals which pass through the arteries[8]. Iron also act as a catalyst for oxygen free radical induces tissue damage. The growing number of conditions in which iron and oxidative stress are thought to be important includes the aging process itself. Excess iron intake may cause iron overload syndrome and Haemacromosis. Therefore reducing iron level is highly necessary for the advance society is for decreased morbidity and increase life span. Our daily intake should at least meet the recommended dietary allowance (RDA). For pre-menopausal women, that means 15mg daily. Men and postmenopausal women need only 10 mg, but pregnant women should consume 30 mg as iron is important for fetal development[9].

Total body iron content in normal adults is the result of the balance between iron losses and iron absorbed from the diet. Iron is lost in sweat, shed skin cells, and perhaps some gastrointestinal loss at a rate of approximately 1 mg/day. Premenopausal adult women lose an additional 0.5 to 1.0 mg/day of iron because of menses. Such iron losses are usually balanced by the absorption of approximately 10 percent of the 10 to 20 mg of iron in the diet in Western affluent societies. Increased absorption of dietary (or medicinal) iron, or iron from multiple transfusions in excess of blood loss will ultimately result in iron overload and iron toxicity. Deferasirox, deferoxamine and deferiprone are known chelating agents used in iron overload syndrome and iron toxicity[10].

Iron in Ayurveda

Iron used as medicine from the vedic period. Blood itself is described as *Lauha Gandhi* (iron odor) Mineral resource are one of the natural resource used in *Ayurvedic* preparations from the time of *Charaka*[11]. Iron is processed in cow's urine and extensively used therapeutically as *Ayaskruti* or as *Lauha rasayana* before the evolution of *Rasashastra* as *Ayaskruti*. *Ayaskruti* is the method where thin plates of iron heated to red hot and was dipped into the *Amalaki* juice (Su.Ci 10-11). The *Iron bhasma* is a later development of drug delivery system from the period of *Bagbhatta* (6th century) and refined the process by *Nagarjuna* who invented the *Bhasma* technology to produce nano-particles by heating and dipping in plants juice (Puta). The *Buddhist* philosopher *Nagarjuna* is the father of metallic medicine in India. Later on developed a special branch of medicine, i.e. *Rasa-Sastra* (Alchemy), dealt with herbo-mineral products. Now available descriptive books on *Rasa-Sastra* like-*Kakshyaputa tantra*, *Rasa Ratna Sammuchaya*, *Rasa tarangini, Rasayoga sagar, Rasendra sara samgraha, Bhaisaya Ratnabali* etc. were mostly composed during 8th century and there after. The iron containing mineral are used internally from 2nd century and it is evident from the preparation of *Navayasa Lauha* and *Lauha Rasayana* in *Charaka Samhita*. The external uses of iron are also found in oil preparation (*Taila Kalpana*) and

Varti preparations (Medicated Stick for Ophthalmic uses). The iron containing compounds like, *Kasisa* (Ferrous sulphate), *Makhika* (Iron pyrite) and *Gairika* (Ochre) (Fe_2O_3) are also used both externally and internally in Ayurvedic system of medicine.

Lauha bhasma is *Tikta (*Pungent), *Madhu*ra (Sweet), *Kashaya* (Astringent) in taste and *Madhu*ra *in Vipaka,* cold in potency and *Ruksha*, *Guru* in qualities. The iron containing compounds are generally cold in potency. It is used in all varieties of diseases including *Pandu* (anemia) (Table 1). *Makhika* (Iron pyrite) is used mostly in geriatric problems. *Kasisa* (Ferrous sulphate) is used in skin diseases including leucoderma, hair fall and anemia, parasitic infestation *(Krimi)*. Gairika (Ochre) is used in gastro intestinal disorders and bleeding disorders. *Lauha Bhasma* can not be taken along without adding *Parada Bhasma* and/or *Abhra Bhasma*. If taken alone it create many complications specially inertia (Jadata)[12]. The improper processed Iron *Bhasma* can induce abdominal pain cardiac pain even death. White pumpkin, til oil, black gram, sour food items and alcohol should be avoided during Iron therapy[13]. The varities of iron are as follows (Figure 1.):

Observations and Discussion

Different methods of preparations are employed in *Ayurveda* to make Iron easy to administrate, palatable and enhance to the absorption of iron in human body. *Ayaskruti* is the primitive invention of internal use of iron which is modified to *Bhasma.* It is believed that *Lauha Bhasma* is better than *Ayaskruti* (Table-2). Iron is a distinct metal where alcoholic preparation is presumed as (*Lohasava*) 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

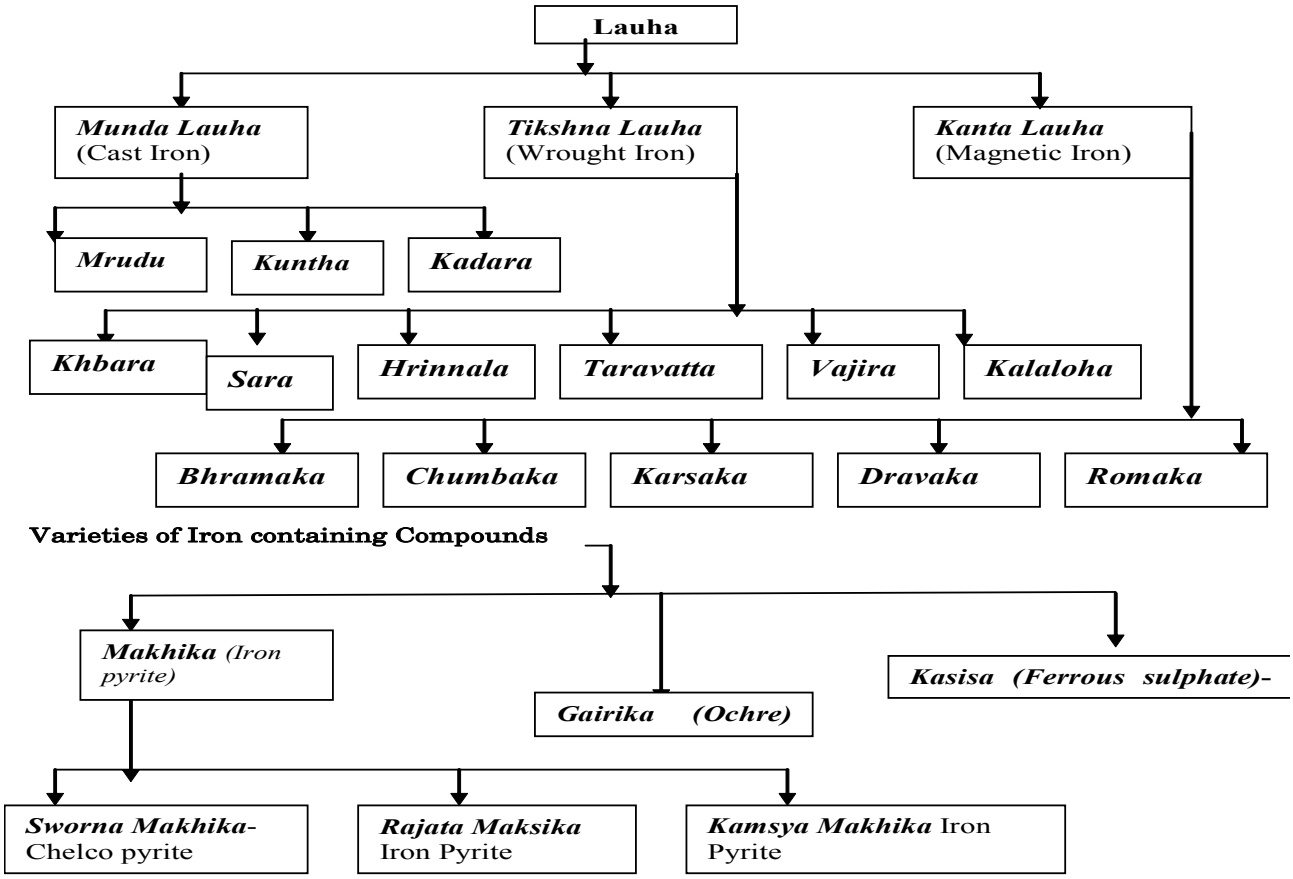

Figure 1. Varieties of Iron

Table 1. Summary of properties and Therapeutic uses of iron and iron containing compounds[16]

Name of the drug	Mode of use and dose	Medicinal properties	Therapeutic uses
Lauha Bhasma (Iron nano particles)	Oral and external use 125-250mg	*Tikta*, *Madhu*ra, *Kashaya* in taste, *Madhu*ra *in Vipaka,* cold in potency & *Ruksha*, *Guru* in quality[18].	Anemia, Jaundice, Pain, Asthma, I.B.S., Piles, Skin disease, Obesity, Pyrexia, Cough, loss of appetite, edema, Spleen and liver disorder, Diabetes etc.
Makhika(Iron pyrite)	Internal use 60-125mg	Sweet taste, slightly sour, cold in potency, *laghu* (light)	Geriatric problems, Normalizes toxic substances of body, can be used in all diseases.
Kasisa (Ferrous sulphate)	Internal use 60-250 mg	Sour and Astringent taste	It is used in Leucoderma, hair disorder, Anemia, Parasite infection, tonic, increases flow of menstrual blood and eye disease. External application on hair colouring agent.
Gairika (Ochre)	Oral administration 250-500mg	Sweet and Astringent taste, Bitter taste, cold potency	Vomiting, Hick-cough, Skin diseases, Bleeding disorders, Skin disorder etc

human society. Among 1735 formulations found in *Bhaisajya Ratnabali*, 293 formulations contains iron nano particles (*Lauha Bhasma*) and 85 formulations are found that containing iron compounds i.e. *Makhika* (Iron pyrite), *Kasisa* (Ferrous sulphate) *& Gairika* (Ochre). Iron and iron compounds are dominating in herbo- mineral preparations and contribute 21.78% of total formulations in 55 diseases. *Lauha Bhasma* is the main constituents of the iron containing formulation and research reveals the Bio-availability of iron is directly proportionate with the *Putas* applied on it[14] (Table 3).

The Iron *Bhasmas* are biologically produced nano particles and are taken along with milk, butter, honey or ghee to make these elements easily

Table 2. Comparison between Ayaskruti and Lauha Bhasma

Different Parameters	Ayaskruti	Lauha Bhasma
Historical evidences	2nd Century	6th Century B.C. (From the time of Bagbhatta)
Manufacture time	One Year	15 days to 1 month or depends upon the Puta)
Puta Used (Process of heating iron thin plates)	No *Puta* is used	20-30 *Gajaputa* is required
Therapeutic Use Time	After One year	Instant Use
Particles Size	Large	Small (Nano particle)
Free Metals	Present	Converted to metallic oxide
Absorption	Low	High
Therapeutic Effect	Low	High
Probable Toxicity	High	Low
Indication	Specific use	Extensive use
Colour	Krishna Varna (Black)	Jambuphala Varna (Redish black)

Table- 3. Number of formulations in different drug administrative mode

Different preparations	*Lauha Bhasma*	*Makhika (Iron pyrite)*	*Kasisa (Ferrous sulphate)*	Gairika
Churna	08			01
Vati Kalpana (tablets)	255	61	03	03
Taila	03	01	03	
Pradeha			03	
Sandhana Kalpana	01			
Abaleha	03			
Modaka	03			
Mandoora	15	01		
Anjana	01			
Varti	01		01	
Potali	01			
Parpati	02			
Total	293	63	10	04

Table 4. External uses of iron- Different formulations of iron and iron containing minerals in external application

Iron Bhasma's indications	Iron containing Minerals
Mahanila Taila	Switra Panchanana Taila
Vyosadi anjana	Kasisa (Ferrous sulphate) di lepa
Dristi Prada varti	Kasisa (Ferrous sulphate) di Tailam
	Mahanila Taila
	Drusti prada Varti

assimilable, eliminating their harmful effect and enhancing their bio- compatibility. The medicinal plants juice used in preparation of *Bhasmas* are seem to be remain chelated with the organic legends derived from the medicinal herbs[15].

Iron is delivered as *Vati Kalpana* (tablet) in maximum formulations 255 (87.03%) following *Churna Kalpana* (Powder form) in total number of 08 (2.73%) formulation for internal administration. The external applications of *Lauha bhasma* (Iron nano particles) 3 (10.23%) formulations and iron compounds 5(5.88%) are also found in *Ayurvedic* preparations like *Anjana*, *Varti*, *Pradeha* and *Taila*. The trace elements iron have no external use in medicine rather parental use of iron has been practiced in modern medicine. (Table-4).

The *Lauha Bhasma* is mostly indicated in *Jvara* (fever) (28 out of 293, 9.55%), *Shoola* (6.14%) (Chronic pain) *Pandu* (anemia) (7.16%), *Vata vyadhi* (neurological disorders) and *Sotha* (edema and inflammatory disorder) each in (4.44%), *Grahani Roga* (3.45%) (Mal absorption syndrome), *Arsha* (Piles), *Raktapitta* (bleeding disorder) etc. which are chronic diseases and bleeding disorders where Iron loss and absorption are profoundly reduced leading to anemia (Table-5).

Conclusion

Iron is extensible used in fifty five chronic diseases including Anemia. Inappropriate decrease of the iron absorption are seen in chronic diseases with increased inflammation, as Hepcidin level are increased in these conditions leading to chronic diseases. Therefore iron containing Ayurvedic preparations can be recommended for the evaluation of serum hepcidin level in chronic diseases indicated in Ayurveda.

Table 5. No of formulations containing iron and iron compounds found in different diseases[17]

S. No.	Name of theDisease	Lauha Bhasma	Makhika	Kasisa	Gairika
1.	Jwara (Fever)	28	09		03
2.	Jwaratisara (Fever associated Diarrhoea)	1			
3.	Atisara (Diarrhoea)	1			
4.	Grahani Roga (I.B.S.)	11	01		
5.	Arsha Roga(hemorrhoids)	08	02		
6.	Agnimandya (Loss of appetite)	06	01		
7.	Krimi Roga (worm infestation)	03			
8.	Pandu Kamala (Anemia and Jaundice)	21	01		
9.	Rakta Pitta (Blood Disorder	06	05		
10.	Yakshma (T.B.)	10	07		
11.	Kasa Roga (Cough)	12	02		
12.	Hikka Swasa (Asthma)	05	01		
13.	Swarabhanga (Hoarseness of voice)	01	01		
14.	Chardi (Vomiting)	01			
15.	Murcha (Unconscious)	01			
16.	Madatyaya (Alocoholism)	01			
17.	Unmada (Psychosis)	02			
18.	Apasmara (Epilepsy)	02	01		
19.	Vata vyadhi (Neural problem)	13	04		
20.	Pitta Roga (Disease of Pitta)	02	01		
21.	Kapha Roga (Diseases of kapha)	01			
22.	Vatarakta (Gout)	04	01		
23.	Urusthambha (pain in the	09			
24	Shoola Roga (Pain)	18	01		04
25	Gulma Roga (Abdominal lump)	05	01		
26	Hrid Roga (cardiac problems)	04			
27	Mutrakrichhra (Urinary tract problem)	02			
28	Ashmari (Calculi)	01			
29	Prameha (diabetes)	14	10		
30	Somoroga (Urinary Problem)	06			
31	Medoroga (Obesity)	04			
32	Udara Roga (Abdominal problems)	01			
33	Pleeha Yakrid (related to Spleen and Liver)	11	04	02	
34	Sotha (edema)	13			
35	Briddhi (Benign Growth)	01			
36	Sleepada (Elephantiasis)	01			
37	Vidradhi (Abscess)	01			
38	Bhagandara (Fistula)	01			
39	Kustha Roga (Skin problems)	01		01	
40	Sittapita Udarda Kostha (Urticaria)	02			
41	Amlapitta (APD)	05	01		
42	Visarpa (Skin Disease)	01	01		
43	Masurika (Chiken pox)	01			
44	Kshudra Roga (Minor clinical problems)	04		04	
45	Netra Roga (Eye Diseases)	06	01	01	
46	Sankhaka Roga (Trigeminal neuralgia)	03			
47	Yoni Vyapata (gynecological problems)	01		01	
48	Garbhini Roga (problems of Pregnant person)	02		01	
49	Sutika Roga (post partum diseases)	07	01		
50	Rasayana (Rejuvenation)	08			
51	Vajikarana (Aphrodisiac)	05	01		
52	Pradara (Vaginal Discharge))	06	01		
53	Garbhini Roga (Anti natal care)	07	03		
54	Bala Roga	02	01		01
	Total	**293**	**63**	**10**	**08**

Current utilization of iron and its compound in Ayurveda may be lead to basic research discoveries in the pharmaceutical industry. There is an ample opportunities exists to exploit inorganic compounds used in traditional medicine for the further development of mettalo-therapeutics.

References

1. Allan Turner CE. 1977. *The place of trace elements in the creation*. Pacific meridic Publication Company, USA: 61-63.

2. Vibha Tripathy 2008. *History of iron Technology in India*. Rupa & Co.: 6-7.

3. Otto Charque 1925. *Natural foods*. Carque pure foods Company Inc.,California: 10-11.

4. Ernest Beutler et al. 2002. History of Iron in Medicine. *Blood cells, Molecules and Diseases*, 29 (3): 297-308.

5. A lanw Cramb, A Short History of Metal in Iron research news and information- 2003 pp-60-63

6. Mario Cazzola, 2008. *Iron in Hematology: A historical prospective*. Hamatology , American Society of Hematology education programme, (1): 150

7. Ralph Oliver Wallerstein 1958. *Iron in Clinical Medicine*. S.R. Mettier University of California press: 291 -293

8. Hord NG, Tang Y, Bryan NS. 2009. Food sources of Iron : The physiologic context for potential health benefits. *American Journal of Clinical Nutrition*, 90:1–10.

9. Randoll B Lauffer 1992. *Iron and Human disease*. Boca ratin Florida CRC press: 47-59

10. Satoskar RS and Bhandarkar SD. 1993. *Pharmacology and Pharmacotherapeutics*. Popular Prakashana, Bombay, 13th rdition : 423

11. Agnivesha, *Charaka Samhita, sutra sthna,* 1st chapter, verse no-68, commentary by Kashinath Sastry, Chaukhamba Sanskrite Academy, Varanasi, 1st edition, 1991.

12. Bhatta Gopala Krushna 1998. *Rasendra sara sangraha*. edited by Tripathy Indradeva, Choukhambha Orientalia, 2nd edition sloka no-1/326, pp-83

13. Madhava, 1999. *Ayurveda Prakash*. edited by Misra Gulrajsharma, Choukhmba Bharati Academy, sloka no 3/22, pp- 392

14. Pandit S et al, 1999. Chemical and Pharmacological evaluation of different Ayurvedic preparations of iron. *Journal of Ethnopharmacology*, 65(2):149-156.

15. A Kumar et. al. 2006. Bhasma Unique Ayurvedic Metalic Herbal Prepartion Chemical Charecterisation. *Biological Trace Element Research*, 109 (3): 231-254.