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# CRITICAL REVIEW ON THE PHARMACEUTICALS ACTIONS OF LAUHA BHASMA(IRON) IN PANDU ROGA W.S.R TO IRON DEFICIENCY ANEMIA

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## ABSTRACT

*Ayurveda* is a highly evolved and codified system of life and health science based on its unique concepts and fundamental principles. Tracing back its citations to Vedas, *Pandu* was a disease of major concern though out history. It has been mentioned in *Rigveda* and *Atharvaveda* by the names *Halima* and *Harima* respectively. Iron Deficiency disorder has been described by the name *Panduroga* thousands of years ago in the *Ayurvedi*c classics. According to WHO, the prevalence of Anemia worldwide is 25%. In India, as per National Family, Health Survey-3 data suggests that Anemia is widely prevalent in all age groups in which 80 % of children under 3 years of age, 58% of pregnant women, about 56% of adolescent girls (15–19 years), 50% of non-pregnant, non-lactating women and 30% of adolescent boys are found anemic. Iron (*Lauha*) is the best remedy for *Panduroga* w.s.r. to Iron Deficiency Anemia. *Ayurvedic* classics have recommended formulations of *Lauha* as well as *Nidana parivarjanam, Snehanam, Swedanam, Samshodhana* for the management of this disease. This

Review article focus on the pharmaceutical properties and action of *lauha* especially in *Pandu roga*.

**KEYWORDS:** *Lauha, Pandu roga, Ayurveda, Anemia.*

## 1. INTRODUCTION

Iron deficiency Anemia is currently the most widespread micronutrient deficiency that affects nearly 1.5 billion people globally.[1] Infants, preschool children, adolescents and women of child bearing age are at greatest risk of developing iron deficiency and its resultant Anemia. Presently available data have shown that about one third of world's population suffers from iron deficiency Anemia. Adolescents (10-19 years) constitute more than 20% of our population in India and 75% suffer from Iron deficiency Anemia (IDA).[2] Adolescence is the most vulnerable phase of life associated with high iron requirements for growth and development, accompanied by expansion of blood volume, muscle mass, natural loss of menstrual blood in girls and increased demand with the onset of pregnancy.[3]

Global data base by WHO on child growth and malnutrition and National Family Health Survey-2 (2000) in India, have suggested high prevalence of IDA i.e. 56% in school age children. Recent regional survey among adolescent girls of urban, semi urban and rural schools in India have found Anemia prevalence rate to be between 61.9 – 85.4%, being highest among rural girls of low socio economic status.

Iron Deficiency disorder has been described by the name *Panduroga* thousands of years ago in the *Ayurvedi*c classics. Tracing back its citations to Vedas, *Pandu* was a disease of major concern though out the history. It has been mentioned in *Rigveda* and *Atharvaveda* by the names *Halima* and *Harima* respectively. William D. Whitney an eminent authority on Vedic literature has explained that the term *Vilohita* mentioned in *Atharvaveda* as Anemia. *(Whiteny W.D.-Translation of Atharva Veda Pt. II)*. One mythological reference in Mahabharata says about the king *Pandu* who was the father of pandavas.

During Samhita period all the authentic text books of *Ayurveda* described the disease entity with full details including specific etiology, pathogenesis, varieties, symptoms and treatment.

## 2. DISEASE REVIEW

### 2.1 Management of Iron Deficiency Anemia[4]

- Prevention stategies

- Reduce poverty;
- Improve access to diversified diets;
- Improve health services and sanitation; and
- Promote better care and feeding practices

- Increase iron rich food
- Bioavailability of iron improved by adding enhancer of iron absorption.
- Iron supplementation
- Blood transfusion

### 2.2 Chikitsa Sutra Of Pandu Roga[5]

1. Nidana parivarjana
2. Kostha snehana
3. Shodhana(Vamana and Virechana)
4. Agni vardhan and Doshaj chikitsa \
5. Administration of Lauha yoga
6. Krimi nashaka Chikitsa and Pathya Apathya

As Iron (*Lauha*) is the best remedy for *Panduroga* w.s.r. to Iron Deficiency Anemia. *Ayurvedic* classics have recommended formulations of *Lauha* as well as *Nidana parivarjanam, Snehanam, Swedanam, Samshodhana* for the management of this disease.

## 3. DRUG REVIEW

### 3.1. Lauha

**Pharmacological Properties of *Lauha Bhasma*[6]** *(R.T.20/83-96)*

- ***Rasa*** : *Tikta, Madhura, Kashaya*
- ***Vipaka*** : *Madhura*
- ***Virya*** : *Sheeta*
- ***Guna*** : *Ruksha, Guru*
- ***Doshaghnata*** : *Kaphapittasamana*
- ***Karma*** : *Chakshushya, Balviryavardhak, Udar Roga Nashnam, Medhya, Deepnam, Kantijanana, Krimihar, Nana-vyadhi-hara*
- **Therapeutic Uses:** *Lauha Bhasma* is indicated in *Kustha, Gulma, Pliharoga, Pandu, Medoroga, Prameha, Shwasa, Kshya Roga, Kasa, Vali, Palita, Shula, Shopha, Agnimandya, Rajorodha, Hridroga,*

*Sutikajwara, Amalpitta, Raktsrava, Mansika-Avsada, Kamala* etc. with specific *Anupana* and *Sahapana.*

- **Apathya During Lauha Therapy** *(A.P.3/221):* The following food stuff should be avoided during *Lauha sevankala,* these are *Kushmanda, Tila Taila, Masha, Rajika, Madya, Amladravya and Masura.*

### 3.2 Iron

**Biological Role of Iron -** Iron is a necessary trace element found in nearly all living organisms. Iron is distributed in the body as iron porphyrins in haemoglobin etc. and as enzymes in cytochrome etc.[7] These compounds works biologically as follows:-

- Iron is essential to the elementary metabolic process in the cell.[8]
- In the respiratory chain, iron functions as an electron carrier.[9]
- Iron is responsible for the transport of molecular oxygen.[10]

**Sources of Iron[11]**

- **All animal food:** Meat, liver, egg etc. except milk and butter.
- **Vegetables:** Peas, lentils, green leaves, spinach, fruits.

**Daily Requirement**

The body is very efficient at recycling the iron obtained from broken-down cells. As a result, daily iron requirements are low as 10-12 mg for a male and 12-18 mg for a female for both of whom only 5 to 10% is absorbed.[12] Iron is lost in sloughed off cells, hemorrhage, and in menstrual flow, bile and other secretions. For a male this amounts to an iron loss of 0.9 mg per day. A non-pregnant female loses 1.2 to 1.8 mg of iron per day after puberty due to menstrual flow. During pregnancy, the iron loss increases to 2.5 mg per day due to placental iron transport.

**Table 01: Iron Balance in men and women.**

| | Iron Requirements(mg) | Dietary Iron (mg) | Required Absorption (%) |
|---|---|---|---|
| Men | 0.9 (0.6-1.2) | 15 | 6 (4-8) |
| Menstruating Women | 1.3 (0.7-2.5) | 10 | 13 (7-25) |
| Pregnant Women | 2.5 (2.0-5.0) | 10 | 25 (20-50) |

**Table 02: Distribution of Iron and its Function.**

| Occurrence | Iron Bound as | Mode of Linkage | Function | Iron content | |
|---|---|---|---|---|---|
| | | | | Total | (%) of body iron |
| Blood | Haemoglobin | Heme | $O_2$ transport | 3g | 65.4 |
| | Plasma | Transferrin | Fe transport | 4 mg | 0.1 |
| Tissues | Myoglobin, cell hemes) | Heme | Cell respiration | 650 mg | 13.9 |
| | Storage iron | Ferritin Hemosiderin | Iron Pool Detoxification | 1 g | 21.5 |
| | | | | 4.65 g | 100.0 |

### 3.3 Pharmacokinetics of Iron

**Absorption of Iron**[13]

Iron is absorbed mostly from the whole of the gastrointestinal tract but a large amount is absorbed from the upper part of the small intestine particularly the duodenum. First dietary or administered iron is reduced to the ferrous form, which diffuses into the mucosal cell where it is reoxidized and then combined with apoferritin (which is being continually formed and destroyed) to form stable ferritin, the iron carrying protein. As ferritin, it crosses the cell and is released to be reduced again to ferrous iron for diffusion across the serosal cell membrane and eventual reoxidation to ferric iron and combination with the iron transport protein, transferrin.

**Iron Absorption is Influenced by a Number of Factors including**[14]

- The amount of iron in the diet
- Medications
- Disease states affecting the gut, eg, coeliac disease, surgery
- Physiological limitations
- Non-haem iron is found in plants such as green leafy vegetables, wholegrain cereals, nuts and dried fruits. Only about 5% of non-haem iron is absorbed. It is also strongly influenced by enhancing or inhibiting factors.
- Haem iron is found in meat, fish and poultry products. It is absorbed much more readily than non-haem iron – about 20% is absorbed. The best source of haem iron is red meat.
- The presence of enhancers or inhibitors

**Enhancers:** Foods which enhance the absorption of iron include those containing:-vitamin C: e.g. broccoli, tomatoes, capsicum, oranges, berries, grapefruit and kiwi fruit. Organic acids: e.g. grapes, tomatoes, citrus fruits and pineapple & Haem iron.

**Inhibitors:** Foods which inhibit the absorption of iron include those containing:-Phytates: e.g. legumes, cereals, nuts, soya protein, cocoa and cola drinks., Polyphenols: e.g. red wine, coffee, tea, cocoa & smoked food., Oxalic acid: e.g. spinach, sweet potato. Calcium: e.g. dairy and soya products such as milk and cheese.

**Iron Metabolism[15]**

Because iron is important for the formation not only of hemoglobin but also of other essential elements in the body (e.g., myoglobin, cytochromes, cytochrome oxidase, peroxidase, catalase). The total quantity of iron in the body averages 4 to 5 grams, about 65 per cent of which is in the form of hemoglobin. About 4 per cent is in the form of myoglobin, 1 per cent is in the form of the various heme compounds that promote intracellular oxidation, 0.1 per cent is combined with the protein transferrin in the blood plasma, and 15 to 30 per cent is stored for later use, mainly in the reticuloendothelial system and liver parenchymal cells, principally in the form of ferritin.

**Transport of Iron[16]**

- Iron circulates in the blood bound to transferrin.
- Plasma iron is normally in equilibrium with iron stores.
- Iron deficiency is associated with a reduction in serum iron level and an increase in iron binding capacity.
- Acute and chronic infections are generally associated with reduced serum iron and decreased binding capacity.

**Storage of Iron[16]**

The body contains 2.5–4 g of iron, with about 2/3 present in red blood cells. About 21.5 percent of the total body iron is in the form of storage iron. Iron is stored predominantly in the form of ferritin and hemosiderin and in bone marrow, liver and spleen. Storage iron is held mostly in the liver. Iron deficiency appears when the stores are largely depleted.

**Excretion of Iron[17]**

- The total daily iron excretion is 0.5 to 1 mg.

- Iron is excreted in the faeces, by desquamation of the skin and hair, in bile, sweat and urine.
- The additional iron loss, due to menstrual bleeding and in milk during lactation occur in women during their reproductive years.

**Adverse Effect of Iron Therapy**

- Iron bound to transferrin is non-toxic. With overdosage, free iron that exceeds the iron binding capacity of transferrin and high ferritin levels cause tissue damage and leads to release of vasoactive substances such as serotonin and histamine.

## 4. DISCUSSION

Due to properties like *Yogvahi* (ability to carry a drug & targeted drug delivery), Very Small Particle Size, *Rasibhavana(quick absorption, & assimilated), Shighrvyapti (easily absorbed & spread quickly in body), Agnideepana* (Increases metabolism at cellular level & act as catalyst) cause *Lauha Bhasma* readily absorbed, assimilated & spread quickly in blood and provides maximum bio-availability of iron. *Lauha Bhasma* with its *Tikta, Kshaya-Rasa, Madhura-Vipaka, Sheeta Virya* and *Saraka Guna* pacify the *Pita Dosha* and treat the *Pitta* predominant *Pandu Roga*. As *Lauha Bhasma* contains iron as a major content i.e. it contain 38.8% iron. Its major role in prevention and treatment of Iron Deficiency Anemia as it is main constituent of hemoglobin.

## 5. CONCLUSION

*Lauha Bhasma* due to its properties and action, became the best remedy for the treatment of Pandu roga. Same is accepted by modern medicines in terms of Iron as the part of hemoglobin called as the red pigment within the blood which supplies oxygen as well as maintain the varna(complexion) of the body.

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