# AYU

## Clinical Research

# Efficacy of *Trikatrayadi Lauha* in *Panduroga* with reference to Iron Deficiency Anemia

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## Abstract

The common nutritional deficiency, iron deficiency, causes Iron Deficiency Anemia (IDA) throughout the world especially in the developing countries. In Ayurveda, different herbal, mineral or herbomineral drugs have been emphasized to combat anemia *(Panduroga)*. *Trikatrayadi Lauha* and Fersolate-CM (a modern medicine taken as standard control) were administered to the patients to evaluate their role in *Panduroga*. A simple random sampling method was followed for the clinical study. The 56 iron deficiency anemic patients of both sexes and age group between 16 to 70 years divided into two groups – Group-A (*n*=34) and Group-C (*n*=22) were treated with *Trikatrayadi lauha* and Fersolate-CM, respectively. Both drugs provided significant effect on the signs and symptoms of *Shrama* (fatigue), *Shwasa* (dyspnea on exertion), *Daurbalya* (weakness), *Pandu Varna* (pallor/yellowish-whitish), *Hridspandana* (palpitation), *Hatanala* (diminished digestive capacity), *Bhrama* (giddiness), *Aruchi* (anorexia), *Arohana Ayasa* (exhaustion during climbing), *Shiroruja* (headache) and *Shotha* (edema). *Trikatrayadi Lauha* provided significant results on Hb gm%, RBC, PCV, MCV, serum iron, percent transferrin saturation and TIBC where as insignificant changes were found in MCH and MCHC. Fersolate-CM provided significant results on Hb gm%, RBC, PCV, MCV, MCH, serum iron, percent transferrin saturation and TIBC whereas insignificant change was found in MCHC. *Trikatrayadi Lauha* showed significant results on *Panduroga* and Iron Deficiency Anaemia (IDA).

**Key words:** Anemia, Fersolate-CM, iron deficiency anemia, *Panduroga, Trikatrayadi Lauha*

## Introduction

*Panduroga* is defined as *Pitta* dominant *Tridoshaja* disease where *Vivarnata* of *Twaka* (discolouration of skin) is mainly *Pandu* (pallor/yellowish-whitish) due to *Alpa Rakta* (reduced blood) or *Vidushya Rakta* (vitiated blood). Anemia is defined as qualitative and quantitative reduction of circulating RBC and/or the percentage of hemoglobin concentration in relation to standard age and sex.[1] Iron Deficiency Anemia (IDA) is the condition in which there is anemia and clear evidence of iron deficiency.[2] Anemia is the most common disorder of the blood and IDA is the most common type of anemia overall.[3] Many features are found in anemia as per modern literatures and Ayurvedic literatures. Some subjective parameters, which are common in both *Panduroga* and IDA and objective parameters which are supporting to diagnose IDA, were taken

to evaluate the present study. *Trikatrayadi Lauha* contains *Amalaki* (*Emblica officinalis* Gaertn), *Haritaki* (*Terminalia chebula* Retz.), *Bibhitaka* (*Terminalia belerica* Roxb.), *Shunthi* (*Zingiber officinale* Roxb.), *Pippali* (*Piper longum* Linn.), *Maricha* (*Piper nigrum* Linn.), *Chitraka* (*Plumbago zeylanica* Linn.), *Musta* (*Cyperus rotundus* Linn.), *Vidanga* (*Embelia robusta* Cl.), *Lauha Bhasma* (incinerated iron), *Mandura* [hydrated ferric oxide (Fe$_2$O$_3$, H$_2$O)] *Bhasma, Sita* (Sugar candy), cow-ghee and honey.[4] *Amalaki* may increase the bioavailability of iron absorption from *Lauha Bhasma, Mandura Bhasma. Musta* also contains copper and manganese that may increase iron metabolism and hemoglobin synthesis. Generally purified herbomineral drugs have no adverse effect whereas Fersolate-CM[5] (Dried Ferrous sulfate 195 mg, Copper sulfate 2.6 mg, Manganese sulfate monohydrate 2.0 mg.) has adverse drug reaction. Considering this, an attempt has been made to evaluate a comparative hematinic activity of *Trikatrayadi Lauha* and Fersolate-CM.

## Aims and Objectives

1. To evaluate the clinical efficacy of *Trikatrayadi lauha*.

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2. To study the adverse effects if any during the course of treatment.

## Materials and Methods

Diagnosis was done on the basis of signs and symptoms of *Panduroga* and IDA. Investigations of blood, urine and stool have been carried out to diagnosis and to rule out any other pathology. A simple random sampling method was followed for the clinical study. The *Vati* (pill) of *Trikatrayadi Lauha* (250 mg each) was prepared.[4] According to original reference *Kanta Lauha* (iron having magnetic property) *Bhasma* is to be used but in this study, simple *Lauha Bhasma* was taken for the preparation due to its nonavailability. All ingredients of the trial drug were collected, approved and prepared at Pharmacy, IPGT and RA, Gujarat Ayurved University. The Pharmacognostical studies of the ingredients of *Trikatrayadi Lauha* and Analytical studies of *Trikatrayadi Lauha* were also carried out. Fersolate-CM[5] was bought from market. Ethical clearance was obtained from IEC of IPGT and RA, GAU, Jamnagar.

### Inclusion criteria
- Presence of symptoms and signs as per Ayurvedic texts.
- Age: 16-70 years
- Sex: Both male and female
- Biochemical parameters:
  - Hb gm%[6]: <12 gm% (female), <13 gm% (male)
  - Serum iron[7-10]: <37 $\mu$g/dl (female),<59 $\mu$g/dl (male)
  - TIBC (Total iron-binding capacity)[7,10,11,12]: >385 $\mu$g/dl
  - Transferrin saturation[2]: <10%
  - PCV[6] : <36% (Female), <39% (Male)

### Exclusion criteria
- Hemoglobin percentage: Below 6 gm%
- Pregnant and lactating women.
- IDA with cardiac complications, diabetes mellitus, renal disorder, acute and chronic blood loss, bleeding disorders, hemoglobinopathies and malignancy.
- IDA in a case of defective absorption like patients of gastrectomy, gastrojejunostomy, sprue syndrome, etc.

### Laboratory investigations
1. Hematology- Hb gm%, RBC, PCV, MCV, MCH, MCHC.
2. Blood biochemistry- Serum iron, percent transferrin saturation, TIBC.
3. Routine urine examination.
4. Routine stool examination.

### Treatment schedule
The 78 patients of both sexes were registered with their written informed consent voluntarily from OPD and IPD of Hospital at IPGT and RA, GAU, Jamnagar, Gujarat. Out of them 56 patients completed the treatment and they were divided into two groups.

1) Group A:  *Trikatrayadi Lauha*
   250 mg. Q.I.D. in the form of *Vati*, before and after lunch and dinner with water.
2) Group C: Fersolate – CM
   1 Tab T. I. D. before meal with water
   Duration of Treatment - Two months.

### Dietic regimens and activities
*Pathya* (Beneficial diet): Green leafy and root vegetables, *patol* (*Trichosanthus dioica*), spinach, *Purana Shali* (one type of old rice, *Oriza sativa*), *Yava* (barley), beet root, rice flakes, bajra, ragi, bengal gram, *Mudga* (*Phaseolus radiatus*), *Adhaki* (*Cajanus cajan*), *Mashur* (*Lens culinaris*), turmeric, apple, *Amalaki* (*Emblica officinalis*), *Dadimba* (*Punica granatum*), banana, *sitaphal* (*Annona squamosa*), dry fruits, *Kharjur* (*Phoenix dactylifera*), *Mridvika* (*Vitis vinifera*), nuts and seeds (poppy seed, black pepper, etc.), yeast, liver, *Jangala Mamsa* (meat of domestic animal), fish, etc.

*Apathya* (Contraindicated diet and activities): *Kshar* (alkali), *Amla* (sour), *Lavan* (salt), *Atiushna* (excessive hot), *Atitikshna* (excessive pungent), *Masha* (black gram), *Pinyaka* (pasted sesame seed), *Tila Taila* (sesame oil), *Nishpava* (lablab bean), *Mrittika* (soil), *Madya* (alcohol), coffee, tea, milk, egg yolk, maize, wheat, *Viruddha* and *Asatmya Ahara* (incompatible and unwholesome food), *Divaswapna* (day sleep), *Ratrijagarana* (night awakening), *Ativyayama* (excessive exercise), *Atimaithuna* (excessive intercourse), *Vegadharana* (suppression of natural urges), *Krodha* (anger), *Chinta* (thought), *Shoka* (grief), etc.

### Criteria for assessment
The improvement of patient was assessed mainly on the basis of following points:

1. The result was assessed on relief of the signs and symptoms of the disease. The signs and symptoms were *Shrama* (fatigue), *Shwasa* (dyspnea on exertion), *Daurbalya* (weakness), *Pandu Varna* (pallor/yellowish-whitish), *Hridspandana* (palpitation), *Hatanala* (diminished digestive capacity), *Bhrama* (giddiness), *Aruchi* (anorexia), *Arohana Ayasa* (exhaustion during climbing), *Shiroruja* (headache) and *Shotha* (oedema). The patients' signs and symptoms were noticed before and after the treatment with scoring pattern depending upon their severities.
2. The result was assessed on improvement of the hemoglobin gram percentage, PCV (packed cell volume), serum iron, percent transferring saturation and TIBC (total iron binding capacity).

## Scoring pattern on clinical features
### Signs and symptoms scoring

*I. Shrama*

| | | |
|---|---|---|
| 1. | No *Shrama* except hard work | 0 |
| 2. | *Shrama* after moderate work for a certain time | 1 |
| 3. | *Shrama* after light work for a certain time | 2 |
| 4. | *Shrama* after routine activities for a certain time | 3 |

- Hard work – e.g.:- weight lifting, moderate work – e.g.:- playing, running, light work -e.g.:- climbing in stair case, walking, routine activities -e.g.:- feeding, bathing, to go to toilet.

*II. Shwasa*

| | | |
|---|---|---|
| 1. | No *Shwasa* | 0 |
| 2. | *Shwasa* after heavy work, relieved soon, tolerable | 1 |
| 3. | *Shwasa* after moderate work, relieved soon, tolerable | 2 |
| 4. | *Shwasa* after light work, relieved later, tolerable | 3 |
| 5. | *Shwasa* after light work, relieved later, intolerable | 4 |

*III. Daurbalya*

| | | |
|---|---|---|
| 1. | No feeling of *Daurbalya* during daily activities | 0 |

2. Sometimes feeling of *Daurbalya*, but performs daily activities — 1
3. Often feeling of *Daurbalya*, but hampers daily activities — 2
4. Always feeling of *Daurbalya*, but unable to perform daily activities even postural movement, bathing, feeding, etc. — 3

*IV. PanduVarna of Twaka, Anana (face), Netra (NetraVartma i.e., sclera), Nakha (nail)*

1. *Panduta* absent in these region — 0
2. *Panduta* present in any one region — 1
3. *Panduta* present in any two region — 2
4. *Panduta* present in any three region — 3
5. *Panduta* present in four region — 4

*V. Hridspandana*

1. No *Hridspandana* — 0
2. *Hridspandana* during mild exertion — 1
3. *Hridspandana* for sometimes during normal activities — 2
4. *Hridspandana* frequently during normal activities — 3
5. *Hridspandana* persistent during normal activities — 4

*VI. Hatanala*

1. Feeling hunger at proper time, taking food 4 times/24 hrs — 0
2. Feeling hunger at late, taking food 3 times/24 hrs — 1
3. Feeling hunger at much late, taking food 2 times/24 hrs — 2
4. No feeling hunger at all, but takes food 1 time/24 hrs — 3

*VII. Bhrama*

1. No *Bhrama* — 0
2. Occasionally present (eg. 1 to 2 times per week) — 1
3. Frequently present (eg. 1 to 2 times day) — 2
4. Persistent (throughout the day) — 3

*VIII. Anna Aruchi*

1. Normal instinct to have a food — 0
2. Dislike to have a food — 1
3. Dislike to have a food even though hungry and takes food — 2
4. Person dislikes and does not take food or takes a little bit — 3

*IX. Arohana Ayasa*

1. No exertion after climbing in stair — 0
2. Exertion after climbing stair — 1
3. Exertion during climbing stair, need of rest — 2
4. Patient is unable to climb stair — 3

*X. Shiroruja and Shotha*

1. Symptoms observed before treatment — 2
2. Some relief after treatment — 1
3. Complete relief after treatment — 0
4. No relief after treatment — 2

**Assessment of result**

i) The paired '*t*' test were carried out for the signs and symptoms and in investigations. The obtained results were interpreted as –
Not significant → $P > 0.05$
Significant → $P < 0.05$, $< 0.02$ and $P < 0.01$

Highly significant → $P < 0.001$

ii) Overall effect on signs and symptoms were calculated by percentage of relief is shown as below-
Complete remission - 100% relief
Marked improvement - $\geq 75 - < 100\%$ relief
Moderate Improvement - $\geq 50 - < 75\%$ relief
Mild improvement - $\geq 25 - < 50\%$ relief
No improvement - $< 25\%$ relief

iii) Overall effect on hemoglobin gm% was calculated by improvement of hemoglobin gm% by the 2 months of therapy, shown as below-
Good improvement - $\geq 1$ gm%
Mild improvement - $\geq 0.5 - < 1$ gm%
No Improvement - $< 0.5$ gm%

iv) To record and report Adverse Drug Reactions (ADR) with the administration of *Trikatrayadi Lauha* (if any).

## Observations and Results

Majority of the patients suffering from *Panduroga* were found in female (91.03%), age between 31 and 50 years (56.41%), married (91.03%) and vegetarian (67.95%) group.

*Trikatrayadi lauha* provided highly significant effect in relieving *Shrama* (47.91%), *Shwasa* (54.0%), *Daurbalya* (62.94%), *Pandu Varna* (14.53%), *Hridspandana* (51.92%), *Hatanala* (74.31%), *Bhrama* (65.64%), *Anna Aruchi* (95.98%), *Arohana Ayasa* (47.09%), *Shiroruja* (88%) and *Shotha* (55.50%) whereas Fersolate-CM showed highly significant effect in relieving *Shrama* (59.52%), *Shwasa* (69.35%), *Daurbalya* (82.50%), *Pandu Varna* (30.79%), *Hridspandana* (75%), *Bhrama* (74.73%), *Anna Aruchi* (85%), *Arohana Ayasa* (53.50%), *Shiroruja* (73%), *Shotha* (91.50%) and significant effect on *Hatanala* (39.25%) [Table 1].

Group-A provided significant result in Hb gm% (4.36%), RBC (2.67%), PCV (4.19%), MCV (1.49%), serum iron (12.37%), percent transferrin saturation (20.77%) and TIBC (7.18%) whereas insignificant changes were found in MCH (2.38%), and MCHC (0.54%). In Group-C, significant result was found in Hb gm% (11.04%), RBC (3.87%), PCV (10.08%), MCV (5.98%), MCH (7.07%), serum iron (21.35%), percent transferrin saturation (34.13%) and TIBC (8.25%) whereas insignificant change was found in MCHC (1.38%) [Tables 2 and 3].

Urine and stool report of both groups were within normal limit before and after treatment.

Overall therapeutic effects on clinical features: It was revealed that *Trikatrayadi Lauha* showed marked improvement in 11.77% patients, moderate improvement in 50.00% and mild improvement in 35.29% patients. Fersolate – CM showed marked improvement in 13.64% patients, moderate improvement in 68.18% and mild improvement in 18.18% patients. Thus, the improvement in clinical features in group-A was 97.06% and in standard control group-C, the result was (100%).

Overall therapeutic effect on hemoglobin (gm%) improvement: it was revealed that *Trikatrayadi Lauha* (group-A) showed good improvement in 8.82% and mild improvement in 20.59% patients. Fersolate – CM (group-C) showed good improvement

**Table 1: Effect on clinical features in Group-A and Group-C**

| Chief complaints | Groups and no. of patients | Mean score B.T. | Mean score A.T. | Mean difference | % Relief | S.D. ± | S.E. ± | 't' | P |
|---|---|---|---|---|---|---|---|---|---|
| Shrama | A n=34 | 2.15 | 1.12 | 1.03 | 47.91 | 0.72 | 0.12 | 8.37 | <0.001 |
| | C n=20 | 2.1 | 0.85 | 1.25 | 59.52 | 0.72 | 0.16 | 7.80 | <0.001 |
| Shwasa | A n=23 | 2 | 0.92 | 1.08 | 54.0 | 0.74 | 0.15 | 7.11 | <0.001 |
| | C n=14 | 1.86 | 0.57 | 1.29 | 69.35 | 0.61 | 0.16 | 7.87 | <0.001 |
| Daurbalya | A n=33 | 1.97 | 0.73 | 1.24 | 62.94 | 0.63 | 0.12 | 10.77 | <0.001 |
| | C n=20 | 2 | 0.35 | 1.65 | 82.50 | 0.59 | 0.13 | 12.57 | <0.001 |
| Pandu varna | A n=34 | 3.44 | 2.94 | 0.50 | 14.53 | 0.75 | 0.13 | 3.89 | <0.001 |
| | C n=22 | 3.41 | 2.36 | 1.05 | 30.79 | 0.99 | 0.21 | 4.91 | <0.001 |
| Hridspandana | A n=26 | 2.08 | 1 | 1.08 | 51.92 | 0.74 | 0.15 | 7.38 | <0.001 |
| | C n=16 | 2 | 0.5 | 1.50 | 75 | 0.52 | 0.13 | 11.62 | <0.001 |
| Hatanala | A n=27 | 1.44 | 0.37 | 1.07 | 74.31 | 0.55 | 0.11 | 10.16 | <0.001 |
| | C n=17 | 1.35 | 0.82 | 0.53 | 39.25 | 0.72 | 0.17 | 3.04 | <0.01 |
| Bhrama | A n=21 | 1.95 | 0.67 | 1.28 | 65.64 | 0.72 | 0.16 | 8.22 | <0.001 |
| | C n=11 | 1.82 | 0.46 | 1.36 | 74.73 | 0.92 | 0.28 | 4.89 | <0.001 |
| Anna Aruchi | A n=21 | 2.24 | 0.09 | 2.15 | 95.98 | 0.73 | 0.16 | 13.51 | <0.001 |
| | C n=10 | 2.0 | 0.3 | 1.7 | 85 | 0.95 | 0.3 | 5.67 | <0.001 |
| Arohana Ayasa | A n=26 | 1.89 | 1 | 0.89 | 47.09 | 0.65 | 0.13 | 6.91 | <0.001 |
| | C n=14 | 2 | 0.93 | 1.07 | 53.50 | 0.92 | 0.25 | 4.37 | <0.001 |
| Shiroruja | A n=17 | 2.0 | 0.24 | 1.76 | 88 | 0.44 | 0.11 | 16.64 | <0.001 |
| | C n=13 | 2.0 | 0.54 | 1.46 | 73 | 0.66 | 0.18 | 7.98 | <0.001 |
| Shotha | A n=9 | 2.0 | 0.89 | 1.11 | 55.50 | 5.55 | 0.60 | 0.2 | <0.001 |
| | C n=6 | 2.0 | 0.17 | 1.83 | 91.50 | 0.41 | 0.17 | 11.0 | <0.001 |

**Table 2: Effect on hematological parameters**

| Hematological parameters | Groups and no. of patients | Mean BT | Mean AT | Mean difference | % of Improvement | SD ± | SE ± | 't' | P |
|---|---|---|---|---|---|---|---|---|---|
| Hb gm% | A n=34 | 9.712 | 10.135 | −0.424 | 4.36↑ | 0.48 | 0.08 | 5.18 | <0.001 |
| | C n=22 | 9.800 | 10.882 | −1.082 | 11.04↑ | 1.31 | 0.28 | 3.89 | <0.001 |
| Total RBC | A n=34 | 4.379 | 4.496 | −0.117 | 2.67↑ | 0.19 | 0.03 | 3.53 | <0.01 |
| | C n=22 | 4.371 | 4.540 | −0.169 | 3.87↑ | 0.25 | 0.05 | 3.24 | <0.01 |
| PCV | A n=34 | 31.803 | 33.138 | −1.335 | 4.19↑ | 1.38 | 0.24 | 5.64 | <0.001 |
| | C n=22 | 31.755 | 34.955 | −3.2 | 10.08↑ | 3.83 | 0.82 | 3.92 | <0.001 |
| MCV | A n=34 | 72.700 | 73.788 | −1.088 | 1.49↑ | 2.25 | 0.39 | 2.83 | <0.01 |
| | C n=22 | 72.936 | 77.300 | −4.364 | 5.98↑ | 5.89 | 1.26 | 3.48 | <0.01 |
| MCH | A n=34 | 22.197 | 22.726 | −0.529 | 2.38↑ | 1.75 | 0.29 | 1.77 | >0.05 |
| | C n=22 | 22.432 | 24.018 | −1.586 | 7.07↑ | 2.22 | 0.47 | 3.35 | <0.01 |
| MCHC | A n=34 | 30.468 | 30.304 | 0.163 | 0.54↓ | 1.61 | 0.28 | 0.59 | >0.05 |
| | C n=22 | 30.691 | 31.114 | −0.423 | 1.38↑ | 1.38 | 0.29 | 1.44 | >0.05 |

Hb gm%: Hemoglobin gram percentage, RBC: Red Blood Cells, PCV: Packed cell volume, MCV: Mean corpuscular volume, MCH: Mean corpuscular hemoglobin, MCHC: Mean corpuscular hemoglobin concentration, , ↑: Increase, ↓: Decrease

**Table 3: Effect on biochemical parameters**

| Parameters of Biochemistry | Groups and no. of patients | Mean BT | Mean AT | Mean difference | % of Improvement | SD ± | SE ± | 't' | P |
|---|---|---|---|---|---|---|---|---|---|
| Serum iron | A n=34 | 27.721 | 31.15 | −3.429 | 12.37↑ | 2.78 | 0.48 | 7.18 | <0.001 |
| | C n=22 | 29.641 | 35.968 | −6.327 | 21.35↑ | 9.18 | 1.96 | 3.23 | <0.01 |
| Transferrin saturation % | A n=34 | 6.172 | 7.454 | −1.282 | 20.77↑ | 1.28 | 0.22 | 5.83 | <0.001 |
| | C n=22 | 6.785 | 9.101 | −2.316 | 34.13↑ | 3.4 | 0.73 | 3.19 | <0.01 |
| TIBC | A n=34 | 462.941 | 429.706 | 33.235 | 7.18↓ | 33.24 | 5.70 | 5.83 | <0.001 |
| | C n=22 | 442.591 | 406.091 | 36.5 | 8.25↓ | 48.79 | 10.40 | 3.51 | <0.01 |

TIBC : Total Iron Binding Capacity, ↑: Increase, ↓: Decrease

in 36.36% patients and mild improvement in 27.27% patients. Although group-A (29.41%) showed less percentage improvement in hemoglobin, but in paired 't' test group-A showed highly significant result.

Fersolate –CM showed some adverse effects viz. nausea, salivation, sour belching (hyper acidity), epigastric pain, flatulence, uneasiness, pain abdomen, liquid stool (diarrhoea), vomiting, loss of appetite and constipation whereas *Trikatrayadi Lauha* had no adverse effects.

## Discussion

Prevalence of female is high than male which may be due to i) insufficient dietary habits ii) social negligence iii) less educated iv) unawareness about receiving extra iron containing diet for their menstrual blood loss. v) world-wide sex incidence toward female is more approximately 72% (nonpregnant 30.20% and pregnant 41.8%).[13] The 31-50 years is the perfect age group for aggravation of *Pitta*. Perhaps these patients had been doing excessive exercise, improper diet and suffering from mental stress due to their responsibilities for their family and society. Among the married, most of them were women. Its reason may be i) more physical work ii) family responsibility iii) mental stress iv) improper diet v) rapid succession of delivery and vi) history of abortion. Maximum patients were vegetarians whereas nonvegetarians were less. It is because- i) vegetarian predominant area ii) iron is present in less amount in vegetables and it is mainly nonheme iron which is less absorbable.[14]

It is seen that to relieve the signs and symptoms and increase hemoglobin percentage both *Trikatrayadi Lauha* and Fersolate-CM are effective. Fersolate-CM relives mentioned clinical features by subsiding anemia with increasing hemoglobin level in blood. *Trikatrayadi Lauha* palliates *Dosha* and corrects hemoglobin level in blood and ultimately signs and symptoms are reduced. *Trikatrayadi Lauha* has *Kashaya* (astringent), *Katu* (pungent) and *Madhura* (sweet) *Rasa* (taste) and it acts as *Dipana* (appetizer), *Pachana* (digestive), *Srotoshodhaka* (channel cleanser), *Tridoshaghna* (body humour specifier), *Raktadhatu Vardhaka* (one which increases blood), *Rasayana* (rejuvenative) and *Balya* (one which increases strength). *Panduhara* (one which subsides pallor) effect is present in *Haritaki*, *Shunthi*, *Lauha* and *Mandura*. *Raktavardhaka* property is present in *Lauha Bhasma* and *Mandura Bhasma*. Iron (*Lauha*) also present in *Amalaki*, *Musta*, honey, and trace amount in ghee. Presence of ascorbic acid (Vitamin C) in *Amalaki* has a significant effect on iron bioavailability from cereals and pulses *in vitro*.[15] *Musta* also contains copper and manganese which may increase iron metabolism and hemoglobin synthesis. *Haritaki* has ferric-reducing antioxidant activity.[16] Therefore, iron absorption easily happens. *Lauha Bhasma* and *Mandura Bhasma* possess significant hematinic and cytoprotective activity.[17] *Lauha Bhasma* has also hemoglobin regeneration efficacy.[18] Honey and ghee act as *Yagovahi* (bioenhancer) by which they enhance the medicinal qualities of the preparation and also help them to reach the deeper tissues.

## Conclusions

IDA may be covered under *Panduroga*. In comparison to standard control drug (Fersolate-CM), *Trikatrayadi Lauha* is effective to relieve the signs and symptoms of *panduroga* viz. *Shrama*, *Shwasa*, *Daurbalya*, *Pandu Varna*, *Hridspandana*, *Hatanala*, *Bhrama*, *Anna Aruchi*, *Arohana Ayasa*, *Shiroruja* and *Shotha*. *Trikatrayadi lauha* provided significant improvement on Hbgm%, RBC, PCV, MCV, serum iron, percent transferrin saturation and to decrease TIBC. No ADRs would be noticed throughout the course of *Trikatrayadi Lauha*, may be used in *Panduroga* or IDA as a safe hematinic drug.

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## हिन्दी सारांश

# पाण्डुरोग (आयरन डेफिसियेन्सि एनिमिया) की चिकित्सा में त्रिकत्रयादि लौह का अध्ययन

सुबीरकुमार खान, एस. एन. व्यास, एच. एम. चन्दोला

विकासशील देशों में यह रोग भोजन में पोषक तत्व एवम् लौह तत्व के अभाव के कारण होता है । आयुर्वेद में वर्णित पाण्डु रोग की तुलना रक्ताल्पता के साथ की जा सकती है । पाण्डुरोग में श्रम, श्वास, दौर्बल्य, पाण्डुवर्ण, हृदस्पन्दन, हतानल, भ्रम, अन्नारुचि, शिररुजा एवम् शोथ आदि लक्षण मिलते हैं । उपरोक्त लक्षण एवम् लौह 'तत्व' की कमी को दृष्टिगोचर रखते हुये पाण्डु रोगियों को २५० मि.ग्रा. त्रिकत्रयादि लौह भोजनपूर्व एवं भोजनोत्तर दोनों समय जल के साथ २ माह तक दिया गया । दूसरे वर्ग में Fersolate CM १ गोली २ बार भोजनपूर्व जल से २ माह तक दी गई । चिकित्सा के पश्चात त्रिकत्रयादि लौह वर्ग एवं Tab Fersolate वर्ग में हीमोग्लोबिन, लाल रक्त कण संख्या PCV, MCV, Serum Iron, Percent transferin saturation एवं T.I.B.C. में सांख्यिकीय दृष्टि से सार्थक लाभ देखने को मिला ।

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