

Ayurvedic preparations for the management of Iron Deficiency Anemia: A systematic review

Janmejaya Samal

Medical Consultant-Urban TB, Catholic Health Association of India (CHA), Chhattisgarh, India

Abstract

Iron deficiency anemia (IDA) is a global public health crisis, so also in India. As per the World Health Organization's report, half of the total anemia is IDA. Ayurveda offers several formulations for the management of IDA. Given in this context, a systematic review was carried out to understand the role of Ayurvedic formulations for the management of IDA. For this purpose, articles were obtained from PubMed and through hand search process. Of the 37 articles identified, 10 articles were finally selected for the review. Of the 10 studies identified, 3 studies were ($n = 10$) exclusively focused on pregnant women, 2 studies ($n = 10$) were exclusively focused on pediatric age group, 1 study ($n = 10$) was exclusively focused on geriatric anemia and 4 studies ($n = 10$) were focused on general population. The response of most of the Ayurvedic formulations was better than Allopathic formulations and there was no untoward effect as observed with iron salts. Statistically significant results were obtained in favor of most of the Ayurvedic formulations in subjective and hematological parameters. Among six different formulations, *Sarva-Jvara-Hara Lauha* is suggested as the drug of choice for IDA as the Hb regeneration with this drug is highest- 0.16 g/dl/day, as reported by one of the studies. In addition, *Punarnavadi Mandura* is currently used as an anemia correcting agent at the community level promoted by the National Rural Health Mission and is included in the Accredited Social Health Activist's drugs kit. As most of these Ayurvedic formulations are found effective against IDA, their usage should be fostered at all level in addition to modern allopathic medicines.

Keywords: Anemia, Ayurveda, *Garbhini Pandu*, iron deficiency, *Pandu Roga*

Introduction

Iron deficiency anemia (IDA) is a global public health crisis, so also in India. As per the World Health Organization's (WHO's) report, there are about two billion anemia cases globally, of which half of them are IDA.^[1] It is a serious health problem as it causes general debility, lethargy, lassitude, suboptimal work performance and in certain situations mental retardation, poor intelligence and abnormal immune response.^[2] Anemia is the late indicator of iron deficiency in the human body, hence the prevalence of iron deficiency is estimated 2.5 times higher than that of anemia.^[1,3] Furthermore, anemia and iron deficiency lead to substantial loss of physical productivity among the adults.^[3] Similarly, IDA during pregnancy is associated with maternal mortality, preterm labor, low birth weight, and infant mortality.^[3] IDA among children affects their cognitive and motor development and increases the susceptibility of infections.^[4] As per the third National Family Health Survey (NFHS), conducted in 2005–2006 in India, the prevalence of anemia among Indian population was 70% in children aged

6–9 months, 55% in females aged 15–49 years, and 24% in males aged 15–49 years.^[5] The state of IDA is being managed with the supplementation of external iron containing drugs for which several types of modern medicines are available in the market.^[6] These modern iron formulations contain one or the other types of iron salts such as, ferrous fumarate, ferrous sulfate, ferrous glycine sulfate, ferric ammonium citrate, ferric hydroxide polymaltose complex, iron choline citrate, iron dextran, ferrous calcium citrate, iron sorbitol citrate, colloidal iron hydroxide, ferrous gluconate, ferric hydroxide, and ferrous succinate.^[7] It has been further reported that the long-term treatment of IDA with these drugs is associated with constipation, heart burn, nausea, gastric discomfort and diarrhea.^[7,8] This was further felt that despite the availability

Address for correspondence: Dr. Janmejaya Samal,
C/o – Mr. Bijaya Ketan Samal, Pansapalli, Bangarada, Gangapur,
Ganjam - 761 123, Odisha, India.
E-mail: janmejaya_samal@yahoo.com,

Access this article online

Quick Response Code:



Website:
www.ayujournal.org

DOI:
10.4103/ayu.AYU_47_16

This is an open access article distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 3.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as the author is credited and the new creations are licensed under the identical terms.

For reprints contact: reprints@medknow.com

How to cite this article: Samal J. Ayurvedic preparations for the management of Iron Deficiency Anemia: A systematic review. *Ayu* 2016;37:163-9.

of modern allopathic anemia correcting agents as mentioned above Ayurvedic formulations are also sufficiently available in the market. The Ayurvedic anemia correcting agents are found to be practiced since centuries.^[9] With this background, an effort was made to review various types of Ayurvedic formulations that have proved efficient in the management of IDA. In Ayurveda, the disease *Pandu roga* can be compared with that of IDA, especially owing to the clinical manifestation of *Panduta* or pallor in the whole body.^[10]

The concept of iron deficiency anemia in Ayurveda

The formation and pathogenesis of a disease in Ayurveda is linked with the vitiation of *Dosha* (Humors). Ayurveda describes three different humors; *Vata*, *Pitta* and *Kapha*, which are responsible for healthy state or causation of disease. *Pandu Roga* is predominantly a result of vitiation of *Pitta Dosha* vitiation along with other *Doshas*, thus *Pandu Roga* is a *Tridoshaja* (of the three humors) disease. The vitiation of *Pitta Dosha* leads to discoloration of the skin and pallor (*Pandu*) owing to reduced blood (*Alpa Rakta*) or vitiation of blood (*Vidushya Rakta*).^[11]

Methodology

Search strategy

The review of literature was carried out in two phases using PUBMED and hand search. Here, the term hand search is meant for searching the articles from cross-references of the articles selected for review and is a process of purposeful selection of articles at the stage of eligibility and inclusion which did not typically undergo the process of identification and screening. Key words used for the purpose of this literature review include “*Pandu Roga*,” “Iron Deficiency Anemia,” and “Ayurveda”. Of 37 articles obtained from both PubMed ($n = 34$) and hand search ($n = 3$), 10 articles were finally selected for this review. This study adopted a narrative review approach instead of a quantitative approach as used in meta-analysis. Hence, no statistical analysis was carried out in this review. Figure 1 is a flowchart showing the selection of articles for this review.

Inclusion and exclusion criteria

Articles published in only English language were included in the review. Furthermore, original researches were only recruited for the purpose of review which precludes review articles and theoretical research. The studies which did not fall in these categories were excluded from the review.

Data extraction and analysis

In the first phase, the articles were identified based on the objectives of the study. In the second phase, the articles identified on the basis of study objectives were pooled together for the purpose of screening by reading the titles and thereafter the abstracts. Articles were excluded at this stage which were not satisfying the inclusion criteria. After this, the eligible articles were further screened by reading the full texts and, those not meeting the inclusion criteria were excluded. By the end of this process, the eligible full-text articles meeting the inclusion criteria were included in the study.

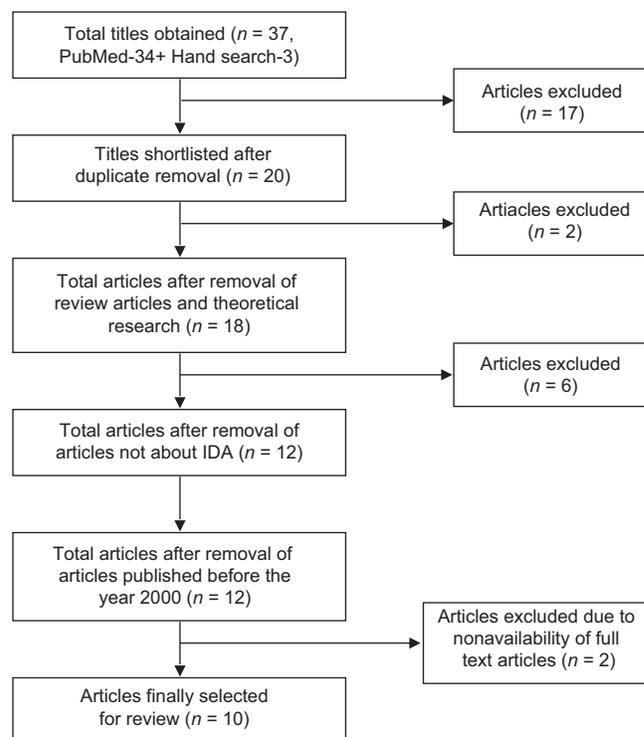


Figure 1: The selection of articles for review

Results

Of the 10 studies identified, 3 studies ($n = 10$) were exclusively focused on pregnant women, 2 studies ($n = 10$) were exclusively focused on pediatric age group, 1 study ($n = 10$) was exclusively focused on geriatric anemia and the rest 4 studies ($n = 10$) were focused on general population. The frequency distribution of various drugs upon which studies have been carried out is shown in figure 2. The following table 1 delineates the role of different Ayurvedic formulations for the management of IDA.

Discussion

Four distinct categories have been studied in this review which includes pediatric group, geriatric group, pregnancy group and the general population group. In the following sections, these four distinct groups have been delineated in detail. In addition, table 2 gives an idea of the dosage, duration and *Anupana* (Vehicle) of important Ayurvedic formulations for IDA.

Formulations for treatment of anemia among pediatric age group

Two studies were focused on pediatric anemia.^[12,13] In these two studies, three different drugs have been studied for their clinical efficacy against anemia among pediatric age group; *Punarnavadi Mandura*, *Dadimadi Ghrita*^[12] and *Trikatrayadi Lauha*.^[13] Statistically significant results were obtained in both these studies in subjective as well as the hematological parameters.^[12,13] In addition to the significant efficacy of these drugs, the probable mode of action have

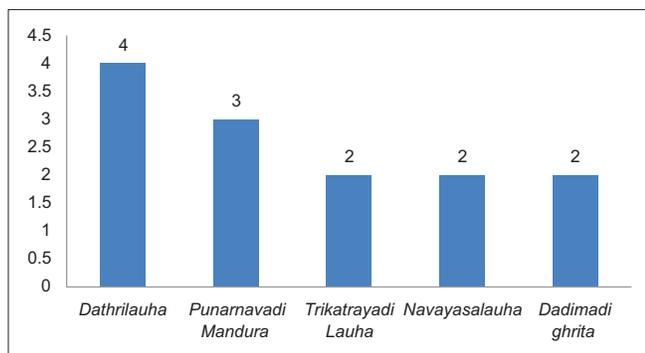


Figure 2: Frequency distribution of various drugs upon which studies have been carried out

also been delineated. *Punarnavadi Mandura* is preferably administered with buttermilk which is having acidic pH and contains lactic acid. Iron absorption is aided by decreased pH.^[14] Furthermore, it might be possible that iron combines with lactic acid to form ferrous lactate before absorption which is used by modern allopathic medicine for the management of IDA.^[6] Alternatively, it may also happen that the proteins of buttermilk or the amino acids released after digestion may combine with iron before the absorption takes place. This point of view is also supported by the WHO as it supports the use of meat and other proteins for the absorption of iron.^[15] However, Ayurveda has a different view on the role of *Punarnavadi Mandura* in controlling anemia which is primarily directed toward *Agni* (Digestive factors).^[16] However, this concept is also indirectly related to the mechanism of absorption of iron in the gastrointestinal tract by the process of *Deepana* and *Pachana*.^[16,17] This explanation of the action of *Punarnavadi Mandura* is not only applicable for the management of anemia among children but also in other age groups in which the mechanism remains the same. *Punarnavadi Mandura* is currently used as an anemia correcting agent at the community level promoted by National Rural Health Mission and is included in the Accredited Social Health Activist's drugs kit.^[18]

Formulations for treatment of anemia among pregnancy group

Three studies focused on the management of anemia during pregnancy with Ayurvedic preparation.^[19-21] In these three studies, two different drugs have been studied for their clinical efficacy against anemia among pregnant women which includes *Dhatrilauha Vati*^[20-22] and *Pandughni Vati*.^[19] Anemia is one of the most common complications of pregnancy and contributes directly or indirectly to 20% of deaths in third world countries.^[22] In Ayurveda, anemia during pregnancy is termed as *Garbhini Pandu* and is primarily caused due to vitiation *Rasa Dhatu* (one of the seven basic body structure described in Ayurveda). According to Ayurveda, during pregnancy, *Rasa Dhatu* has to shoulder three times more responsibilities than in normal individuals. It becomes responsible for the nourishment of three factors; fetus, breast and the pregnant woman. Due to this stress on *Rasa Dhatu* during pregnancy, there are more chances that

the pregnant woman gets affected with *Garbhini Pandu*.^[22] *Dhatrilauha Vati* is composed of *Lauha Bhasma*, which is an iron supplement and has *Deepana* (Stomachic) property that leads to proper metabolism and *Dhatu Poshana* (tissue nourishment). *Amalaki* (*Embllica officinalis* Gaertn.) and *Amruta* (*Tinospora cordifolia* Wall. ex Sring.) help in the nourishment of basic structural body constituents and are supportive for the absorption of iron. *Yastimadhu* (*Glycyrrhiza glabra* L.) has *Shonita Sthapana* (prevent bleeding tendency and normalize hematopoiesis) property. The cumulative effects of all the ingredients leads to the correction of metabolism, iron absorption and improved blood formation, thereby correction of anemia.^[19]

Formulations for treatment of anemia among geriatric age group

Of the 10 studies only one study was focused on correction of anemia among geriatric age group.^[16] The drug studied for its efficacy against anemia in old age is *Punarnavadi Mandura*. Anemia is common in old age with the prevalence of approximately 13% among persons with 70 years or more.^[23] Most commonly anemia in old age is associated with underlying disease such as cancer, chronic kidney disease and congestive heart failure or due to malnutrition or iron deficiency.^[24,25] Furthermore, anemia during old age is associated with increased hospitalization and mortality.^[26] In the study, majority (90%) of the old age participants were females^[16] and were consistent with other studies that anemia among females at the age of 70 or more is common.^[27] The drug *Punarnavadi Mandura* acts as an anemia correcting agent in old age owing to its several components. *Triphala*, *Trikatu*, *Chitraka*, *Vidanga* and *Pippalimula* have appetizing, digestive, and carminative properties which improves digestive power and ultimately absorption of the drug. The components such as *Trivrita*, *Haritaki* and *Danti* act as laxative which help in relieving constipation mainly found in old age. *Haridra*, *Amalaki*, *Pippali*, *Punarnava* and *Trivrita* were mentioned as *Panduhara* (antianemic) by various *Acharyas*. *Amalaki*, *Danti*, *Pippali*, *Punarnava*, *Kushtha* and *Daruharidra* are documented as drugs having immuno modulatory action and antioxidant properties having the potential of providing beneficial health effects in geriatric anemia.^[16]

Formulations for treatment of anemia among general population

Four studies were focused on the general population.^[28-31] The Ayurvedic formulations studied in these four studies for their efficacy against IDA among general population include *Navayasa Lauha*, *Punarnavadi Mandura*, *Dhatrilauha*, *Pradarantaka Lauha*, *Sarva-Jvara-Hara Lauha*, *Brihat Yakrdari Lauha*, *Dadimadi Ghrita* and *Trikatrayadi Lauha*. There are several explanations regarding the efficacy of Ayurvedic formulations in combating IDA in general population. It is observed that a substantial portion of these Ayurvedic formulations contain organic matter that includes ascorbic acid, sugars, amino acids and organic acids, which

Table 1: Studies showing the role of Ayurvedic formulations on iron deficiency anemia

Author	Journal and YOP	Study type	Methodology	Major outcomes
Sharma DC, Chandiramani D, RiyatM,SharmaP	Indian J Clin Biochem 2007;22:123-8.	Clinical trial conducted at hospital setting	Six Ayurvedic iron containing formulations <i>Navayasa Churna</i> , <i>Punarnavadi Mandura</i> , <i>Dhatri Lauha</i> , <i>Pradarantaka Lauha</i> , <i>Sarva-Jvara-Hara Lauha</i> , and <i>Brihat Yakrdari Lauha</i> were given in a dose of 250 mg twice daily for 30 days to six groups of IDA patients; each group consisting of 20 patients	Statistically significant rise ($P<0.001$) in all hematological parameters were observed - Hb, PCV, TRBC, MCV, MCH, MCHC and plasma iron, PS and FER. Total iron-binding capacity decreased significantly ($P<0.001$). The Hb regeneration rate was 0.10 g/dl/day for allopathic preparation; while it was above this value for all Ayurvedic formulations except <i>Pradarantaka Lauha</i> which was least effective. <i>Sarva-Jvara-Hara Lauha</i> was the drug of choice as Hb regeneration was highest with this drug 0.16 g/dl/day
Pandya MG, Dave AR	Ayu 2014;35:252-60.	Hospital-based clinical trial	50 clinically diagnosed geriatric anemia cases were administered with 500 mg of <i>Punarnavadi Mandura</i> in two equally divided doses postlunch and dinner with buttermilk for 90 days	Statistically significant results were obtained in all the chief complaints such as <i>Aruchi</i> (95.38%), <i>Daurbalya</i> (94.59%), <i>Pindikodwestana</i> (93.46%), <i>Jwara</i> (80%), and <i>Bhrama</i> (82.43%) except in <i>Akshikuta Shotha</i> (29.63%), however, hematological parameters were not statistically significant
Das A, Saritha S	Anc Sci Life 2013;32 Suppl 2:S86.	Clinical trial conducted at hospital setting	50 children of 10-14 years of age were administered with 500 mg of <i>Punarnavadi Mandura</i> and 10 ml of <i>Dadimadi Ghrta</i> twice daily with luke warm water for 84 days	Statistically significant ($P<0.001$) results were obtained after the administration of these two drugs among these children with IDA. Furthermore, significant results were obtained in hemoglobin and other hematological parameters such as MCHC, MCV, PCV, reticulocyte count, peripheral blood smear, serum iron, serum ferritin, and total iron binding capacity in the treatment group ($P<0.001$)
Arankalle PS	J Ayurveda Holist Med 2014;2:1-10.	Clinical trial (open)	Participants with anemia during pregnancy were administered with <i>Dadimadi Ghrta</i> with a dosage of 10 ml orally, empty stomach at morning with a cup of warm water for 30 days	Relief of anemia was observed among 16 participants up to 51%-75% followed by 8 participants up to 76%-100% and 11 participants up to 26%-50%. Increase of Hb g% was observed among 15 (42.86%) participants up to 1 g%, in 10 (28.57%) participants up to 1.5 g%, in 5 (14.28%) participants up to 0.5 g% and >2 g% in 3 (8.57%) participants
Rupapara AV, Donga SB, Dei L	Ayu 2013;34:276-80.	Clinical trial	22 patients selected from outpatient Department of <i>Streeroga</i> and <i>Prasutitantra</i> (Obstetrics and Gynecology), Gujarat Ayurved University, were randomly divided into two groups; Group A ($n=12$) <i>Pandughnivati</i> two tablets of 500 mg thrice daily and Group B ($n=10$) <i>Dhatrilauhavati</i> one tablet of 500 mg thrice daily	On comparison, a significant level of improvement was observed in Group B (<i>Dhatrilauhavati</i>) in terms of subjective and objective parameters than Group A (<i>Pandughnivati</i>). In Group B, results observed were highly significant ($P<0.001$) in pallor and dyspnea. The results in fatigue, palpitation, anorexia and leg cramps were significant (<0.05). Hb%, TRBC, and PCV were slightly increased and TIBC was decreased in Group B, whereas no result was observed in other objective parameters
Roy A, Dwivedi M	Ayu 2014;35:283-8.	Clinical trial	58 cases of pregnant women were selected by simple random sampling between 4 th and 7 th month of pregnancy with clinical diagnosis and laboratory confirmation of IDA. 500 mg tablets of <i>Dhatri Lauha</i> , in two divided doses, with normal potable water, were administered after food for 45 days with three follow-up intervals, at every in 15 th day intervals. This study was carried out at the outpatient Department of Prasutitantra, Faculty of Ayurveda, Sir Sundarlal Hospital, IMS, BHU, Varanasi, Uttar Pradesh, India	<i>Dhatri Lauha</i> showed statistically significant ($P<0.01$) improvement in majority of signs and symptoms. The improvement in subjective parameters include weakness, fatigue, palpitation, breathlessness, heartburn, pallor, and constipation. Similarly, the objective parameters such as hemoglobin, RBCs, hematocrit, mean corpuscular volume, mean corpuscular hemoglobin concentration, RBC distribution width, mean platelet volume, serum iron, and total iron binding capacity showed statistically significant results

Contd...

Table 1: Contd...

Author	Journal and YOP	Study type	Methodology	Major outcomes
Ramadevi G, Jonah S, Prasad UN	Int J Res Ayurveda Pharm 2014;5:708-12.	Clinical trial	50 pregnant women qualifying the diagnostic criteria of IDA (<i>Pandu roga</i>) were selected from the OPD and IPD of SDM Ayurveda Hospital, Udupi, Karnataka. These participants were administered with 500 mg of <i>Dhatri Lauha</i> tablet thrice a day orally for 4 weeks	<i>Dhatri Lauha</i> showed significant improvement in subjective and objective parameters of the study participants. The subjective parameters include weakness, fatigue, dizziness, palpitation, exertional dyspnea and tastelessness. The objective parameters include Hb g%, RBC, PCV, MCV, MCH, and MCHC
Khan SK, Vyas SN, Chandola HM	Ayu 2012;33:62-7.	Clinical trial	56 IDA patients of both sexes and aged between 16-70 years divided into two groups - Group A ($n=34$) and Group C ($n=22$) were treated with <i>Trikatrayadi Lauha</i> (250 mg) and Fersolate-CM, respectively. The drugs were administered four times a day and thrice a day for 2 months, respectively	Both drugs provided significant effect on subjective parameters such as fatigue, dyspnea on exertion, weakness, pallor/yellowish-whitish, palpitation, diminished digestive capacity, giddiness, anorexia, exhaustion during climbing, headache and edema. <i>Trikatrayadi Lauha</i> and Fersolate-CM showed significant results on Hb g%, RBC, PCV, MCV, serum iron, percent transferrin saturation and TIBC, whereas insignificant changes were found in MCH and MCHC. <i>Trikatrayadi Lauha</i> showed significant results on <i>Pandu roga</i> and IDA
Kumar A, Garai AK	J Ayurveda Integr Med 2012;3:215-22.	Randomized, double-blind, placebo-, clinical study	123 IDA patients (children 1 to 16 years) were administered with <i>Trikatrayadi Lauha</i> and a placebo for 10 weeks with a dosage of 0.5 ml/kg body weight in two divided doses. Normal diet was advised according to age. Follow-up was done in every 2 weeks and feedback was taken at 5 th and 10 th week	Of 123 cases, 107 completed the treatment. <i>Trikatrayadi Lauha</i> suspension showed statistically significant improvement in hematological parameters, Hb%, total RBC, PCV, MCV, MCH, and MCHC. Hemoglobin level improved significantly with a mean increase of 1.94 g/dl in 5 weeks (8.52-10.46 g/dl, $P<0.001$) and 3.33 g/dl in 10 weeks (8.52-11.85 g/dl, $P<0.001$). By the end of 10 th week, Hb % increased by 39.10%, whereas in the placebo group Hb% increased by only 3.33%. Significant improvement in serum iron, TIBC and serum ferritin level was observed. In placebo group, improvement in the hematological parameters were not satisfactory
Nazmul Huda Md, Daya Shankar Mishra, Singh JP	J Homeopath Ayurveda Med 2014;3:162.	Randomized, nonblinded, controlled trial	30 participants equally divided into three groups. Group 1, 2 and 3 received Starch capsule, <i>Dhatri Lauha</i> (250 mg) and <i>Navayasa Lauha</i> (250 mg) respectively, for 30 days. Hematological parameters were used to assess the results among these three groups	Statistically significant results ($P<0.05$) were obtained for <i>Dhatri Lauha</i> and <i>Navayasa Lauha</i> in hematological parameters; Hb (g/dl), PCV (%), MCV (fl), MCH (pg), MCHC (g%)

IDA: Iron deficiency anemia, TRBC: Total red blood cell, MCV: Mean corpuscular volume, MCH: Mean corpuscular hemoglobin, MCHC: Mean corpuscular hemoglobin concentration, PCV: Packed cell volume, TIBC: Total iron-binding capacity, Hb: Hemoglobin, FER: Plasma ferritin, PS: Percentage saturation, OPD: Outpatient department, IPD: Inpatient department

Table 2: Dosage, duration and Anupana of important Ayurvedic formulations for iron deficiency anemia

Name of the drug	Dosage	Anupana (vehicle)	Duration of treatment as per studies	Remark
<i>Punarnavadi Mandura</i>	250 mg twice daily	Buttermilk	30 days	The dosage and the duration of treatment reported in various studies were in accordance with the need and design of the studies, however the same can be customized according to the need of the patients. In addition, multiple studies have used multiple dosages, however the convenient dosages have only been mentioned here where the results are statistically significant which helps in avoiding prolonged treatment unnecessarily
<i>Dhatri Lauha</i>	500 mg thrice daily	Buttermilk/honey	30 days	
<i>Dadimadi Ghrita</i>	10 ml twice daily	Luke warm water	84 days	
<i>Pandughnivati</i>	500 mg thrice daily	Luke warm water	90 days	
<i>Trikatrayadi Lauha</i> (suspension form)	0.5 ml/kg body weight	Not mentioned	10 weeks	
<i>Trikatrayadi Lauha</i> (tablet)	250 mg 4 times daily	Not mentioned	60 days	
<i>Navayasa Lauha</i>	250 mg twice daily	Honey	30 days	

cause better absorption of non-haem iron.^[28] Furthermore, most of the Ayurvedic formulations are administered with some *Anupana* (vehicle) as in the case of *Navayasa Lauha* and *Dhatri Lauha*. These two formulations are administered with honey as *Anupana* which is a mixture of glucose and fructose and iron may combine with these sugars for absorption. This is also advocated in Allopathic medicine as iron formulations are combined with sugars such as iron polymaltose complex and ferrous gluconate.^[32] *Punarnavadi Mandura* and *Dhatri Lauha* are also administered with buttermilk and the mechanism of action and iron absorption has been explained in this draft. *Brihat Yakrdari Lauha* is being administered with ginger extract which also helps in iron absorption owing to its carbohydrate and protein contents.^[33]

Conclusion

From this review, it is clearly evident that most of the Ayurvedic formulations studied for their efficacy against IDA proved effective. All these studies showed statistically significant results in both subjective and hematological parameters. Another advantage of these Ayurvedic formulations is that they are safe and effective against IDA at all ages and groups. A comparative study between one of the best allopathic hematinics and six Ayurvedic formulations proved that some Ayurvedic formulations are even better than the former. The efficacy is evident from various hematological parameters such as plasma iron, percent saturation, plasma ferritin and Hb%. As most of these Ayurvedic formulations are found effective against IDA, their usage should be fostered at all levels in addition to modern allopathic medicines.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

References

- WHO, UNICEF, UNU. Iron Deficiency Anaemia: Assessment, Prevention and Control: A Guide for Programme Managers. Geneva, Switzerland: WHO, UNICEF, UNU; 2001.
- Gardner GW, Edgerton VR, Senewiratne B, Barnard RJ, Ohira Y. Physical work capacity and metabolic stress in subjects with iron deficiency anemia. *Am J Clin Nutr* 1977;30:910-7.
- Zimmermann MB, Hurrell RF. Nutritional iron deficiency. *Lancet* 2007;370:511-20.
- Baker RD, Greer FR, Committee on Nutrition American Academy of Pediatrics. Diagnosis and prevention of iron deficiency and iron-deficiency anemia in infants and young children (0-3 years of age). *Pediatrics* 2010;126:1040-50.
- Arnold F, Parasuraman S, Arokiasamy P, Kothari M. Nutrition in India. In: National Family Health Survey (NFHS-3) India 2005-2006. International institute of population Studies, Mumbai 2009.
- Singhal M. Iron Formulations 2001; Drug Index 4. p. 325-30.
- Sharma DC, Mathur R. Correction of anemia and iron deficiency in vegetarians by administration of ascorbic acid. *Indian J Physiol Pharmacol* 1995;39:403-6.
- Satoskar RS, Bhandarkar SD, Ainapure SS. Pharmacology and Pharmacotherapeutics. 16th ed. Mumbai: Popular Prakshan Pvt., Ltd.; 1999. p. 471.
- Nadkarni KM. The Indian Materia Medica. 3rd ed., Vol. 2. Bombay: Popular Prakashan; 1976. p. 54-67.
- Aacharya YT, editor. Charaka Samhita of Agnivesha, Chikitsa sthana, Ch. 16, Ver. 7-9. Reprint edition. Varanasi: Chaukhambha Surbharati Prakashana; 2005. p. 527.
- Shastri A, editor. Sushruta Samhita of Sushruta, Sutra Sthana. Ver. 12. Reprint ed., Ch. 14. Varanasi: Chaukhamba Sanskrit Sansthan; 2007. p. 50.
- Das A, Saritha S. PA03. 17. A clinical evaluation of Punarnavadi Mandura and Dadimadi Ghrita in management of pandu (Iron deficiency anaemia). *Anc Sci Life* 2013;32 Suppl 2:S86.
- Kumar A, Garai AK. A clinical study on Pandu Roga, iron deficiency anemia, with Trikatrayadi Lauha suspension in children. *J Ayurveda Integr Med* 2012;3:215-22.
- Sharma DC, Mathur R, Singh PP. Iron metabolism. A review. *Ind J Clin Biochem* 1993;8:80-101.
- Sood SK. Epidemiology of iron deficiency anemia. *Mediwave* 1995;1:12-7.
- Pandya MG, Dave AR. A clinical study of Punarnava mandura in the management of Pandu Roga in old age (geriatric anemia). *Ayu* 2014;35:252-60.
- Kaviraj Ambikadatta Shastri, editor. Sushruta, Sushruta Samhita, Sutrasthana, Dravadravya Vidhi Adhyaya, 45/54. Reprint Edition. Varanasi: Chaukhambha Sanskrit Sansthan; 2005. p. 176.
- Samal J, Dehury RK. A review of literature on Punarnavadi Mandura: An ayurvedic herbo-mineral preparation. *Pharmacogn J* 2016;8:180-4.
- Rupapara AV, Donga SB, Dei L. A comparative study on the effect of Pandughnivati and Dhatri Lauha in the management of Garbhinipandu (Iron deficiency anemia). *Ayu* 2013;34:276-80.
- Roy A, Dwivedi M. Dhatri Lauha: Right choice for iron deficiency anemia in pregnancy. *Ayu* 2014;35:283-8.
- Ramadevi G, Jonah S, Prasad UN. A clinical study on the effects of Dhatri Lauha in Garbhinipandu (Iron deficiency anemia). *Int J Res Ayurveda Pharm* 2014;5:708-12.
- Dutta DC. Textbook of Obstetrics. Calcutta: New Central Book Agency (p) Ltd.; 1998. p. 282.
- Salive ME, Cornoni-Huntley J, Guralnik JM, Phillips CL, Wallace RB, Ostfeld AM, et al. Anemia and hemoglobin levels in older persons: Relationship with age, gender, and health status. *J Am Geriatr Soc* 1992;40:489-96.
- Joosten E, Pelemans W, Hiele M, Noyen J, Verhaeghe R, Boogaerts MA, et al. Prevalence and causes of anaemia in a geriatric hospitalized population. *Gerontology* 1992;38:111-7.
- Ania BJ, Suman VJ, Fairbanks VF, Rademacher DM, Melton LJ 3rd. Incidence of anemia in older people: An epidemiologic study in a well defined population. *J Am Geriatr Soc* 1997;45:825-31.
- Penninx BW, Pahor M, Woodman RC, Guralnik JM. Anemia in old age is associated with increased mortality and hospitalization. *J Gerontol A Biol Sci Med Sci* 2006;61:474-9.
- Guralnik JM, Ershler WB, Schrier SL, Picozzi VJ. Anemia in the elderly: A public health crisis in hematology. *Hematology Am Soc Hematol Educ Program* 2005;1:528-32.
- Sharma DC, Chandiramani D, Riyat M, Sharma P. Scientific evaluation of some ayurvedic formulations for correction of iron deficiency and anemia. *Indian J Clin Biochem* 2007;22:123-8.
- Arankalle PS. Effect of Dadimadi Ghrita in Garbhini Pandu (Anaemia in Pregnancy). *J Ayurveda Holistic Med* 2014;2:1-10.
- Khan SK, Vyas SN, Chandola HM. Efficacy of Trikatrayadi Lauha in Panduroga with reference to iron deficiency anemia. *Ayu* 2012;33:62-7.
- Nazmul Huda MD, Mishra DS, Singh JP. Clinical evaluation of an ayurvedic preparation for the treatment of iron deficiency anemia in patients. *J Homeopath Ayurveda Med* 2014;3:162.
- Hillman RS. Hematopoietic agents: Growth factors minerals and vitamins. In: Hardman JG, Limbird LE, editors. Goodman and Gilman's. The Pharmacological Basis of Therapeutics. 10th ed. New York: McGraw-Hill; 2003. p. 1487-517.
- Antia FP, Brown J. Clinical Dietetics and Nutrition. 2nd ed. London: Oxford University Press; 1973. p. 637.

हिन्दी सारांश

लौह की कमी से होने वाले एनीमिया के प्रबंधन में प्रयुक्त विभिन्न आयुर्वेदिक औषधि योग- एक व्यवस्थित समीक्षा

जन्मेजय समल

लौहत्व की कमी से होने वाला एनीमिया (आई.डी.ए.) एक वैश्विक स्वास्थ्य संकट है। विश्व स्वास्थ्य संगठन के अनुसार होने वाले कुल एनीमिया रोगियों में आधा, आई.डी.ए. के कारण होता है। कई आयुर्वेदिक औषधि योग आई.डी.ए. (आई.डी.ए.) के प्रबंधन के लिए उपलब्ध हैं। इस संदर्भ में, आई.डी.ए. के नियंत्रण के लिए आयुर्वेदिक दवाओं की भूमिका को समझने के लिए एक व्यवस्थित शोध समीक्षा की गई। इस उद्देश्य के लिए लेख पबमेड और स्वतः खोज प्रक्रिया के माध्यम से प्राप्त किये गये। चुने गये ३७ लेखों में से अंत में १० लेखों का समीक्षा के लिए चयन किया गया। १० अध्ययन में से ३ अध्ययन ($n = १०$) विशेष रूप से गर्भवती महिलाओं के लिये, २ अध्ययन ($n = १०$) विशेष रूप से बाल आयु समूह, १ अध्ययन ($n = १०$) बुढ़ापे की एनीमिया पर विशेष रूप से आधारित थे और ४ अध्ययन ($n = १०$) सामान्य व्यक्तियों पर आधारित थे। अधिकांश आयुर्वेदिक दवाओं का प्रभाव एलोपैथिक दवाओं से बेहतर था और इनमें से किसी में भी अनुपयुक्त परिणाम जैसे कि लौह लवण द्वारा प्राप्त होते हैं, नहीं पाये गये। व्यक्तिपरक और हिमेटोलोजिकल निष्कर्ष में सभी शोध में प्रयुक्त आयुर्वेदिक दवाओं के पक्ष में सांख्यिकीय दृष्टि से सार्थक परिणाम पाये गये। इन छह विभिन्न दवाओं में से सर्व-ज्वरहरलौह को आई.डी.ए. के लिए उत्तम दवा के रूप में, क्योंकि एक शोध के आधार पर उसके प्रयोग से हीमोग्लोबिन निर्माण उच्चतम प्राप्त हुये हैं (०.१६ g/dl/day)। इसके अलावा वर्तमान में पुनर्नवादि मण्डूर एक एनीमिया नियंत्रण औषधि के रूप में स्थापित किया जा सकता है। इसको राष्ट्रीय ग्रामीण स्वास्थ्य मिशन के माध्यम से प्रचार मिला है और मान्यता प्राप्त सामाजिक स्वास्थ्य कार्यकर्ता (ए.एस.एच.ए.) की किट में भी उपलब्ध है। इससे यह निष्कर्ष निकाला गया कि शोध से स्थापित इन सभी पांडुहर आयुर्वेदिक औषधि योगों का प्रयोग वर्तमान में प्रयुक्त एलोपैथिक दवाओं के साथ पांडु चिकित्सा में उचित रूप से किया जा सकता है।