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"An Emerging Ayurvedic Approach To Treat Iron Deficiency Anemia (Ida) In Children: A Critical Review"

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ABSTRACT:

Background and Aim:

Iron deficiency anemia (IDA) is a global public health disaster and As per the World Health Organization's (WHO's) report, 50% of total anemia cases globally are IDA. In *AyurvedaA*, lot of drugs have been mentioned to treat Anemia (*Pandu roga*) and is supposed to treat the disease relatively early and more rationally. *Ayurveda* considered to treat iron deficiency anemia disease of children in terms of improvement in hemoglobin, serum iron etc. Main aim of this article is to elaborate about iron deficiency anemia and its treatment by poly herbal and herbal drugs of *Ayurveda*.

Methodology:

To achieve significant literature author uses the key words “Iron Deficiency Anemia in Children,” and “Ayurvedic treatment”, “*Pandu Roga”*, “Anemia”, “Herbo-mineral and herbal drugs” was parallel searched in Google Scholar, web of science, Science direct, Scopus, Medline and PubMed Central journal literature.

Result:-

Ten research publications were included in the final selection after systematic analysis.

Conclusion: -

Many of the Ayurvedic herbo-mineral drugs such as *Yasad bhasma, Mandur bhasma, Navayasa Lauha, Dhatri Lauha , Punarnava Mandura rasa, Trikatrayadi Lauha* etc. and some herbal drugs such as *Amalaki, Pippali, Haritaki, Punarnava* etc. are very effective in treatment of Iron deficiency anemia (IDA) in children. The absorption of iron may have increased by the *Anupana* (recommended vehicle) for the Ayurvedic preparations. Ayurvedic herbo-mineral drugs and herbal drugs are more effective than allopathic preparation because there are no reports of any side effect, untoward reaction or intolerance.

Key words: -. Pandu roga, Iron Deficiency Anemia in Children, Herbo-mineral drugs, Herbal drugs.

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Introduction:

Anemia is the principal nutritional dearth in the world, and it especially affects children in developing countries. Nutritional anemia among children continues to pose a considerable problem throughout the world.[1] It is widely prevalent in the developing countries especially South East Asia. According to the National Family Health Survey (NHFS-3) data the incidence of anemia in urban children is 71%, rural is 84% and overall is 79%. [2-3] Anemia resulting from lack of sufficient iron for synthesis of hemoglobin is the most common hematologic disease of infancy and childhood. It is estimated that 30% of the global population suffers from iron deficiency anemia; most of those affected lives in developing countries.[4] Anemia rarely is a disease by itself; almost always it is a consequence of another acquired or genetic abnormality. The various medical conditions that results in anemia encompass nearly the full spectrum of human disease. Anemia is defined as a hemoglobin concentration in blood below the lower limit of the normal range for the age and sex of the individual. According to WHO, Anemia is a state in which the hemoglobin concentration in the blood is lower than levels considered normal for age gender, physiological state and altitude, as a consequence of the cause of this disease.[5-6] At the extreme of life, the definition of anemia in infancy and childhood is different from adult. The lower limit of normal Hb concentration at birth is 14g/dl, and this decrease to 11g/dl by 1 year of life. This Hb decrement, referred to as the physiologic anemia of infancy, occur as part of the normal physiologic adaptation from the relatively hypoxic intra uterine existence to the well oxygenated extra uterine environment. Also as fetal erythropoises is replaced, the MCV decreases from birth (100-130 fl) to 1 year to (70-85 fl).[7] Even after the 1st year of life, normal child Shows high Hb than actual blood Hb and MCV values remains considerably low than those occurring in adolescent and adult. The lower limit of normal Hb concentration in both male and female children, ages 1 to 2 year, was 10.7 gm/dl, and the value rose with advancing age until adult level will reach at the age of 15 to 18 year.[8]

Iron deficiency anemia (IDA) is the most common nutrient deficiency in the world. Symptoms of iron deficiency are subtle and non specific and often only become apparent with severe anemia. Infants and children with iron deficiency, with or without anemia, have been characterized with impaired neurodevelopment, such as longer sensory pathway transmission. Relative to healthy infants, infants with iron deficiency anemia are more wary,

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hesitant, and easily tired; are less active; are less attentive to instructions and demonstrations; and tend to stay closer to their caregivers. It has been suggested that these behaviors may contribute to impaired development through functional isolation.[9-10] *Pandu Roga* as described in Ayurvedic classics, is equated with the anemia, and it occurred due to deficiency or vitiation of *Rakta Dhatu*.[11-12] As per the *Samprapti* of *Pandu Roga*, *Pandurata Varna* (yellow complexion) appeared due to the *Kshaya* (reduction) of general complexion of the body. Therefore in case of *Pandu* there is *Alpa Rakta* (deficiency of blood), leads to pallor.[13] The treatment of Iron deficiency anemia (IDA) by Ayurvedic compound is better than Allopathic formulations because it no untoward effect as observed with iron salts. The long term treatment of Iron deficiency anemia (IDA) with Allopathic formulations (iron salts) is allied with several side effects, like, constipation, diarrhoea heartburn and upper gastric discomfort etc. [14-15] Recent studies proves that Allopathic formulations damage free radicals in the intestine which is very side effect.[16] Many of the Ayurvedic formulation such as *Yasad bhasma, Mandur bhasma, Navayasa Lauha, Dhatri Lauha , Punarnava Mandura rasa, Trikatrayadi Lauha* etc. and some herbal drugs such as *Amalaki, Pippali, Haridra, Punarnava etc.* considered as *Panduhara* (anti-anemic) property.[17]

Aim: - This review article focuses on the detail about Iron deficiency anemia (IDA) in children and its best treatment by different Ayurvedic compound and herbal drugs of *Ayurveda.*

Iron deficiency anemia (IDA) in Children:-

Iron deficiency is probably the most common nutritional disorder in the world and prevalent in developing countries.[18] World Health Organization (WHO) estimates that 2.5 billion people have anemia caused by iron deficiency. That could be prevented by fortification of food. Fairbanks (1971) described, that iron deficiency is probably the most common organic disorder seen in clinical medicine. In population surveys by Food and Nutrition Board (1971) reported that in low economic groups this anemia is prevalent. Iron deficiency anemia (IDA) poses many serious health problems in Children such as loss of appetite, general weakness, lethargy, poor school performance, mental retardation, poor intelligence and abnormal immune system. [19] Iron is more readily absorbed in the ferrous state, but most of the dietary iron is in the ferric form. Most of the iron is absorbed in the upper part of intestine.[20]

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Risk factors:

In children, onset of Iron deficiency anemia is usually due to inadequate intake together with rapid growth, prematurity and gastrointestinal losses due to excessive consumption of cow's milk.[21] In infantile age, iron stores are sufficient to provide erythropoesis in the first 6 months. But in premature/low birth weight infants the stores are exhausted earlier due to less storage. In premature baby delayed umbilical cord clamping may improve the iron status and reduces the possibility of iron deficiency.[22]Another important risk factor for iron deficiency anemia in infants due to giving excessive cow's milk for feeding because cow's milk disrupt the absorption of iron. After the 6th month, iron, zinc, phosphorus, magnesium, calcium and vitamin rich solid food should provide to infants. According to the world Health organization (WHO) data, 98% of the iron requirement from aged 6–23 months should be provided by solid foods. [23-24]

Clinical manifestation:-

Iron deficiency anemia affects almost all system of children. The clinical findings observed in iron deficiency anemia are summarized in Table 1.

Table 1:- Clinical finding of Iron deficiency anemia in Children-

Gastro-intestinal system (GIT)	1. Loss of appetite (Anorexia) 2. Pica 3. Angular stomatitis 4. Atrophic glossitis 5. Dysphagia
Skin	1. Pallor
Cardio-vascular system (CVS)	1. Cardiomegaly 2. Tachycardia 3. Tiredness 4. Decrease effort capacity
Immune system	1. Decrease immunity power
Central nervous system (CNS)	1. Irritability 2. Breath-holding spell 3. Learning disability

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	4. Behavioral disorder 5. Mental retardation 6. Sleep disturbance

Diagnosis:-

For diagnosis of any diseases, detailed history and physical examination is necessary. History related to prematurity, type of feeding in first 6 month of life (mother milk/cow milk/ formula milk), type of solid foods after 6 month of age and bleeding history should be interrogated. Important investigation for confirmation of Anemia is complete blood count (CBC), Reticulocyte count, serum urea and creatinine (for renal disorders), Serum iron, total iron binding capacity and Ferritin. In infants younger than 6 months, anemia should consider when hemoglobin is less than 9 g/dL. CDC recommended screening time of anemia for gestational mature infants between 9 and 12 months of age, then 6 months later and after that annually from 2 to 5 years of age. For preterm and low–birth weight infants before 6 months of age again at 9 to 12 months of age, and again 6 months later.

Treatment by Allopathic medicine:-

For the treatment of iron deficiency anemia in children, many allopathic formulations are available and they contain mainly ferrous sulphate, ferrous fumarate, and ferrous gluconate etc. colloidal iron hydroxide, ferrous succinate and ferric hydroxide.[25] The long term iron therapy (2-3 months) with dose 3–6 mg/kg/day is linked with many side effects, like, constipation, diarrhea heartburn, nausea, upper gastric discomfort and damaging free radicals in the intestine. Parenteral iron treatment (iron dextran) can be administered when oral iron treatment is not tolerated. Major side effects of parental iron therapy is allergy, anaphylaxis, hypotension, nausea, vomiting and abdominal pain may develop especially following rapid infusion. The treatment of Iron deficiency anemia (IDA) in children by Ayurvedic compound is better than Allopathic formulations because it no side effect as observed with iron salts**.** The present study is one such step in this direction.

Methodology

This review work was carried out by using a wide-ranging and organized data mining approach. To achieve significant literature author uses the key words “Iron Deficiency Anemia in Children,” and “Ayurvedic treatment”, “*Pandu Roga”*, “Anemia”, “Herbo-mineral and herbal drugs” was parallel searched in Google Scholar, web of science, Science direct, Scopus, Medline and PubMed Central journal literature.

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Result:-

Every substance what is find on the earth has its medicinal value in one or another way as quoted in *Ayurveda*. For the treatment of Iron deficiency anemia (IDA) in children many Ayurvedic formulation and herbal drugs delivered better response than Allopathic medicine without any specific side effect. Total 10 research publications were included in the final selection after systematic analysis.

Ayurvedic formulation for Iron deficiency anemia (IDA) in children:

Many of the Ayurvedic herbo-mineral drugs such as *Yasad bhasma, Mandur bhasma, Navayasa Lauha, Dhatri Lauha , Punarnava Mandura rasa, Trikatrayadi Lauha* etc. and some herbal drugs such as *Amalaki, Pippali, Haritaki, Punarnava* etc. are very effective in treatment of Iron deficiency anemia (IDA) in children.

Herbo-mineral drugs:-

- Research studies prove that herbo-mineral drugs such as *Punarnava Mandura rasa, Dadimadi Ghrita, Trikatrayadi Lauha* are effective in subjective as well as the hematological parameters in iron deficiency anaema.[26-27]
- *Punarnava Mandura rasa* and *Dhatri Lauha* are administered with buttermilk which help in proper absorption of iron. [28]
- *Navayasa Churna, Dhatri Lauha* and *Pradarantaka Lauha* administered with honey as the vehicle; which increase the absorption of iron.
- *Punarnavadi Mandura* is effective in controlling anemia which is primarily directed toward *Agni* (Digestive factors).[29]
- *Trikatrayadi Lauha* is an Ayurvedic herbo-mineral formulation described in *Bhaishajya Ratnavali* for the treatment of *Pandu roga*.[30] Main ingredients of this drug is *Triphala,* which help in rejuvenation; *Trikatu,* which act as appetizer; and *Trimada*, which is digestive. The palatability of the *Trikatrayadi Lauha* suspension is good in children and after the drug administration does not produce any specific complaints such as gastric disturbances or constipation etc. [31]
- Experimental studies conducted on albino rats with ayurvedic herbomineral compounds like *lohasava* and *Navayas Lauha* give effective result in increase hemoglobin level and RBC count. [32-33]

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- If iron and zinc are provided together, because they have chemically similar absorption and transport mechanism, iron and zinc have been thought to compete for absorptive pathways.[34] In Ayurvedic classics, the *Yashada Bhasma* has been claimed to cure the *Pandu roga* (anemia) & *Kasa* (cough).

Herbal drugs:-

- One research work proves that *Haritaki* has been effective to increase blood hemoglobin level scientifically. [35]
- *Amalaki (Emblica officinalis)* is richest source of Vitamin C and it helps in absorption of iron in gastro-intestinal tract.
- Vitamin C (Ascorbic acid) reduces ferric iron (Fe+++) to ferrous iron (Fe++), which remains soluble even at neutral pH and is better absorbed. *Amalaki* also enhances the production of RBCs and increases immunity in the body.
- *Pippali* is a proved drug to increase bioavailability and absorption of iron.
- *Triphala* have *Anulomana* property and effective in constipation effect of iron.
- *Punarnava* have diuretic effect in Ayurveda and help in reduce edema of anemia.
- Leaves of *Moringa oleifera* are the most potent supplier of iron in every form. Thus this natural herb is very effective in control iron deficiency anemia of all age groups.
- *Moringa oleifera* is rich in several phytochemicals which are necessary for iron take up and absorption by human body hence it can consider as a complete package of nutrition as well along with treatment against anemia.[36]

Summary:-

Iron deficiency anemia is considered a serious public health problem in the world today. Nutritional iron deficiency is the most common cause of anemia in India. The nearest correlation of iron deficiency anemia (IDA) of children can be made with *Pandu Roga* in *Ayurveda*. *Pandu Roga* occurred due to deficiency or vitiation of *Rakta Dhatu*. Iron deficiency anemia (IDA) in children is a very common disease in the society due to poor nutrition, pica, and delay in start complementary feeding. Common features of anemia in children are loss of appetite/Anorexia, general weakness, poor school performance, recurrent infection, failure to thrive and mental weakness. Now a day's allopathic medication (iron salts) are frequently use for treat the anemia but the side effects of oral and injectable

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allopathic iron preparations are very common. Ayurvedic herbo-mineral drugs and herbal drugs are very effective for treatment of iron deficiency anemia of children. The Ayurvedic drugs are well tolerated by the patients and there are no reports of any side effect, untoward reaction or intolerance. Many of the Ayurvedic herbo-mineral drugs such as *Yasad bhasma, Mandura bhasma, Navayasa Lauha, Dhatri Lauha, Punarnava Mandura rasa, Trikatrayadi Lauha* etc. and some herbal drugs such as *Amalaki, Pippali, Haritaki, Punarnava* etc. are very effective in treatment of Iron deficiency anemia (IDA) in children. The absorption of iron may have increased by the *Anupana* (recommended vehicle) for the Ayurvedic preparations. So we can say that *Ayurvedic* preparations are better than Allopathic hematinic for the treatment of iron deficiency of children.

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