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Review Paper

STUDY OF BODY TISSUE IRON DEFICIENCY (IRON DEFICIENCY SYNDROME)

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ABSTRACT:

Whenever IRON deficiency word is used everybody thinks of iron deficiency anemia which is a major nutritional problem in our country. Iron is a part of haemoglobin which has oxygen carrying capacity to the tissues that is the most important function of haemoglobin. Here we discuss the other aspects where Iron works at cellular level in different system of body as co-enzyme including major role in cardiovascular central nervous system. This article presents iron deficiency syndrome and improvement with elemental iron replacement before significant rise in hemolgobin level iron is a essential element working at cellular level and iron deficiency results in iron deficiency involving all major system of body. Elemental iron replacement results in significant improvement of cardiac as well as neuronal function. Till now the elemental iron deficiency in the body tissues causing disease had been given no attention at all and iron replacement is till today done only to treat iron deficiency anemia and nothing else. So, the underlying article is important in the state that no book or even on internet mention the use of the elemental iron in several diseases is describe below. "A study of more than 3000 patients over a period of 20 years from year 2002 to 2022 in three Medical Colleges."

KEY WORDS : Iron deficiency, Co-enzyme at cellular level, various systems of body

INTRODUCTION:

Anemia being the most overt and easily recognizable manifestation of ID. IDA is almost universally thought to be the soul consequence of iron lack. All clinical featuers seen in a patient with IDA are then ascribed to the anemia. While the major portion of body iron exits in haemoglobin, iron is also an important constituent of myoglobin in muscles and of various heme and non- heme iron dependent enzymes present in every cell, playing a vital role in cellular respiration and a lots of other biochemical reaction. An appreciation of the essential role of iron in the normal functioning of body tisuue as a constituant of energy backbone required for various physiological processes would make one realize how some of the manifestation observed inpatient with ID could be, and indeed are, due to deficiency of iron per se, independent of the anemia. This manifestation can occur with haemoglobin that may be within the normal range in order to emphasizes the role of iron in physiological processes and classifies situations where clinically significant effects are seen due to ID in the absence of or independent of anemia, a concept of IDS (Iron Deficiency Syndrome) is essential. IDS can thus be defined as the whole spectrum of clinical manifestation and abnormalities in physiological functions of body organs and tissue at rest of during stress, primary or secondary due to iron deficiency. It has been adequately shown that in iron deficiency states, normal functioning of several body tissues such as myocardium, peripheral nerves, jejunum, brain, liver and kidney is significantly altered and that this is primarily as a result of iron deficiency at the cellular level. These adequately justifies broad concept of iron deficiency syndrome, a term which should replace the conventional but restricted term iron deficiency anemia.

METHOD OF STUDY:

A 65 years old female patient, who came with H/O chest pain, ghabhraman for 15 days Cloudiness of brain for three months. Chest pain on exertion, associated with breathlessness and muscle cramps more at night. We investigated the patient and the

result we got were Hemoglobin 6.46 GM/DL, MCV-5, 9FL, serum Ferritin 2.46 ng/ML, Peripheral smear - Hypochromic microcytic, aniso - poikilocytosis & Eliptocytes 2D Echo Cardiogram – ejection fraction 45% Electro cardiogram Anterolateral wall ST-T changes sign of significant ischemia For treatment we started elemental iron replacement starting with 500mg elemental iron in 500 ml normal saline after negative test dose. This was followed by another 500 mg session 24 hours apart. Another 500mg elemental iron (iron sucrose) was given 24hrs. Later thus total 1500mg of iron sucrose given. We had explained about Anaphylactic reaction, multipal joint pain like side effect but no side effect was found. After 72 hours we repeated all the reports and improvement found in 2D Eccho cardogram- ejection fraction 58% and Electro Cardiogram was also improved. Serum ferritin increased to 315.25 NG/ mL. And increase to 7.12gm which was not significant. Concluding that anemia was not responsible for the symtoms of the patients but it was the lack of elemental iron which was responsible and it's effect was seen within 72hrs.

DISCUSSION:

Our body required multiple enzyme, co-enzyme and various elements like iron, zinc for proper function at cellular level, iron is one of the most essential element working as co- factor in various enzymatic reaction i.e actin-myosin movement in smooth muscles, peripheral nerve and in brain synapses for neuronal transmission, iron deficiency is associated with dysfunction at all levels. These may include fatigue, lack of concentration, decreased mental, physical and cognitive performance (10) cardiovascular strain, reduced immune function, infection, reduced exercise tolerance, fatigue, gastritis, structural and chemical change in the hair, nails and skin and impairment of thyroid, metabolism and catecholamine and secretions in gastrointinal system (11) pospatum, patient may have decreased capacity of uterine muscle contraction leading to post partum hemorrage, cardiovascular symptoms(palpitation), fatigue giddiness, breathlessness, depression, infection, lactation failure and prolonged hospital stay (12). The fetus may suffer intrauterine growth restriction, premature delivery, increased prenatal, morbidity and mortality (13), fetal programming (14) low birth weight and sometimes irreversible damage to central nervous system, with impartment of psychomotor development. All these complaints and conditions are most likely due to lack of tissue iron working as co-enzyme which can be easily measured by doing serum ferritin test. In most of the cases it has been found very low requiring replacement. Elemental iron replacement improves function at all these level much before increase in heoglobin level. Hb level takes 8-10 days for 1gm/dl to rise. Here all cellular level changes improve within 48-72hr. I.e. mental cloudiness improves & patient feels refreshed and healthy, muscle crapms improve. Echo Cardiogram changes reverted to normal. Ejection fraction improved in 72hrs from 45% to 58%. These all changes appear before the change in Hb level that was 7.12 cm/dl which was not significant after 72hrs. So, it is concluded that not the deficiency of Hb but deficiency of elemental iron was responsible for IDS. Elemental iron is critical for growth of all cells it is there are not surprising that IDS independently increases morbidty and mortality (9) Iron sucrose complex therapy a valid first – line option for the safe and rapid correction of IDS (16). In the third trimester the most reasonable choice is parentral iron. Postpartum the only choice is parentral iron. The liver stores the elemental iron of the body. It can be measured by getting Serum Ferritin Test. If its value is less than 15 ng/ml, Liver stores of iron are ZERO. Liver stores 1000mg of elemental iron. If Serum Ferritin value is less than 30ng/ml, it is insufficient. False high value are found in infection of any part of body as seen in recent covid infection. The Iron stores in liver are used first to build Hemoglobin level. Even if the haemoglobin is14gm, Liver stores may be Zero. That is the reason that in every IDA(Iron Deficiency Anemia) the patient must get S. Ferritin value done. In treating the iron deficiency enemia as per given below formula is used worldwide. (2.4 X Wt. of patient In kg. X (14-present HB in male or 13 % HB in female) = mg. of iron. (2.4 X Wt. In kg X (14-present HB in Female) = mg. of iron for replacement. But S. Ferretin if lower than 15 ng/ml, 1000 mg. Iron should be added extra to replace the storage and 500 mg iron if less than 30mg/ml level If patient is more than 50yrs. Of age than the storage iron doze should be reduced to 750mg rather than 1000mg. The liver function test SGPT to be done before giving iron as there are chances iron may be deposited in liver as in hemochromatosis or rarely hemosiderosis in the brain.

Elemental iron is present in all tissue of body acting as co-enzyme of functioning of the tissue as for example :

- In heart, it will make the Actin- Myocin movement normal within 48-72hrs. This makes cardiogram normal as in benign VPCs, T wave inversion in inferior wall leads, anterior wall leads. It will revert the Mitral Valve prolapse, increase the force of contraction of the cardiac muscles and increase the ejection fraction to normal as seen is case report and relieve fatigue and breathlessness and ECG may revert to normal.
- In nervous system it helps in transmission of impulses in neuronal synopses and make neuronal condition normal and relieve the patient of depression, anxiety, Parkinson's disease, Migraine etc. It will also relieve the Peripheral neuropathy by making peripheral

nerve conduction normal. It's usefulness is yet to be determined in the patients of Myasthenia Gravis.

- **On Smooth muscles**: In uterus, it increases the tone of uterine muscles and helps in normal delivery and removes the changes of post partum haemorrhage. It will also act on smooth muscles of esophagus and help in treating Plummer – Vinson syndrome. In patients of menorrhagia is Iron deficiency is treated, than there is no need of hysterectomy as observed by me several patients as bleeding stops within 48hrs. By replacing the total iron (DEF of Hb+store)

- In gastrointestinal muscles movement it improves the peristaltic movements of esophagus and establishes the smooth transmission of food from upper portion of esophagus to stomach and normalizes the esophagio- gastic junction thus preventing GERD (Gestro Esophagial Reflux Disease)

- In chronic diarrhea same iron works, increasing the tone of intestinal muscles and diarrhea of 3 month's duration will stop in 48hrs as seen in many patients with relief of Anemia too.

- **On Skeletal Muscles**: It increases tone of skeletal muscles, relieve fatigue, relieve night cramps, ocular muscles around lens will contract normally and reduce the refractory error.

- **Immunity:** It will increase the immunity and chances of infection post- operatively. Replacement of blood preoperatively is usually done, but if time permits (48-72hrs.) iron infusion will help fight the tissue against infection (as I mentioned earlier, infection gives false high value of S. Ferritin, so these fact is to be kept in mind. It will help in early wound healing).

- **Fetal development:** Proper fulfilment of Iron storage of body will help developing normal fetus with good birth weight and without deformity. It usually help in normal delivery as uterine contraction are normal as mentioned earlier.

As seen above it will help in about all the systems of body as co- enzyme as seen in nearly 3000 patients in more than 20 years starting from year 2002 to 20022, one to two patient daily where each anemic patient was to undergo S. Ferritin test. Normal Hb patient as mentioned earlier may also show Zero iron storage in the liver (S. Ferritin less than 15ng/ml) which it replaced it will cure the underline disease. As mentioned increasing haemoglobin level will take atleast 1Gm. Per week also to rise but the cure of the underline condition of the patient will be seen within 48-72hrs.

How to give Elemental Iron:

Elemental iron is available in the form of iron dextran (imferon, not used now a days) in iron sucrose and FCM (Feric Carboxy Maltos) injection iron isomaltoside available in 100mg and 500 mg strength. Any one of them is to be given in 500ml. Normal saline. Not more that 500mg should be given in 24hrs. As far as possible Antihistaminic should be given prior to the infusion and injection dexamethasone (2cc) to be given after the completion of infusion. These infusion should be given slowly around minimum 4-5hrs. Period and to be watched closely for any sign of adverse reaction and anaphylaxis . The benefits of giving elemental iron by parental route should be clearly explained to the patient in his language and the way he understands and also the possibility of anaphylaxis reaction.

SUMMARY:

As per the latest reports, In India, nearly 75% population is suffering from iron deficiency anemia. It means that one can assume LOW SYRUM FERRETIN LEVEL AND LOW BODY IRON STORES IN NEARLY 90% OF OVERALL POPULATION. This shows us the seriousness of the condition which can be corrected very easily. In my working tenure, I have treated many patients suffering from various diseases as described above. There might be other effects of elemental iron on other systems. I request my doctor colleagues and friends to work further on this subject and help in treating the

REFERENCES:

1. Clinical medicine 1st edition 33:301 : prevalence of IDA in India
2. Atr Med journal 1991 : 7g : 195-196 Total elemental iron replacement is a safe, receive & most effective method of correcting IDA who precluded from oral iron therapy.
3. Associate physician India 2000 Feb :48 (2) 204 – 6 evaluation of cardiac function in IDA before and after total dose iron therapy
4. Department of medicine, Seth GS medical college and KEM hospital parel
5. Impaired ventricular performance in IDA is observed which improves after IDI

6. Top of form Br. J haematol 199 mar, 41(3) 365-72 work capacity heart rate and blood lactare response to iron treatment.
7. V.S. national library of medicine, Acta haemntol 1983:70 (3) 189-93 national institute of health Electrophysiologic abnormalities of heart in IDA
8. AJCN org : Elemental iron ruplienet is safe in moderately anemic pregnant women.
9. Department of Obsgynec longuldak, Turkey iron is crudical for all living form in their methobolim Rx1 iron is superior to oral iron respect to haematological response (83) which is safe (84)
10. Alleyan M. Home MK Miller J Individualized treatment for iron deficiency anemia in adults. Am J med 2008 : 121:94-8.
11. Al- Momon AK, al-Meshan A al-Nuaim L, Saddiue A, Abotalib Z, treatment for iron deficiency duringregancy. Eur J Obstel Gynecol Report Biol 1993; 69: 121-4Perequsnyc G huch R huch R, Breyment C parentral iron therapy is obstetrics : 8 year experience with on sucrose comples Br. J Nutr 2002-: 88:3-10
12. Bryemann C. Zimmermann R. Huchr, Hutch A use of recombinant human erythoeoietin in communication with parentral iron in the treatment of postpartum anaemia. Eur J Clin Invest 1996 ;26:23-30
13. Singi K. Fong YF, Kuperean PA comparison between intravenous iron polymltose complex (Ferrum Hausmann) and oral ferrous fumarate in the treatment of iron deficiency anaemia in pregnancy EUR j Haematol 1998; 60:119-24
14. Hercberg S, Galan P. Preziosi P. Consequences of iron deficiency in pregnant women cureetn issue. Cin Drug invest 2000; 29(suppl): 1-7
15. Lozoff B, Geirgieff MK iron deficiency and brain development, Semin Pediatr Neurol 2006; 13: 158-65
16. Breymann C. Treatment of iron deficiency anaemia in pregnancy and postpartum with special focus on intravenous iron sucrose complex. J Med Assoc Thai 2005; 88 Suppl 2:S108-09.