

# NUTRITIONAL DEFICIENCY ANEMIA- A REVIEW

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**Abstract:** The most common form of anemia due to deficiency in diet is Nutritional anemia, still it is the easy form of anemia to manage, compared to other anemias. The most common types of nutrient deficient anemia are iron, folate and cobalamin. Anemia caused by nutrient deficiency, mostly do not show signs in the initial phase until all the nutrient stores in the body are depleted. The comprehensive search of Pub-med, Science Direct, Healthline and Medline was done for conducting this review. The main aim of the study is to understand the different types of Nutrient deficient anemia, their signs, symptoms and dietary management. The causes of anemia are enlisted along with dietary management. Some cases of Nutrient deficient anemia need an extensive investigative technique for precise diagnosis and treatment.

**Keywords:** Nutrient deficiency, Iron deficiency anemia, Folic acid deficiency anemia, Cobalamin.

## NUTRIENT DEFICIENT ANEMIA

In most cases of hematological diseases, the easiest for managing and treatment is nutritional anemia. Some types of anemia are mostly dependent on pathophysiology where as some types can be corrected with supplementing and providing adequate amount of vitamins and minerals [1].

## PREVALENCE

Nutritional deficiency disorders are the major cause for majority of morbidity and mortality along with dropout [2]. Iron deficiency which is a common nutritional deficiency which is a common nutritional deficiency has its effect on the work capacity and also on motor and mental development among infants, children and adolescents [3]. Some studies have stated that nutritional deficiency anemia can have possible association (Heshmat et.al., 2006). Nutritional deficiency anemia is most prevalent in infants of 9-24months due to the lack of supplement iron in their diet and due to accelerated growth rate [4].

According to WHO, Anemia means (Hb < 13g/dl for men and Hb < 12g/dl for women). Iron which is important for normal development of multiple essential processes. Iron deficiency is caused by various diseases and also by many physiological condition which may increase the requirement of the mineral. Iron deficiency anemia is diagnosed when iron level is <60µg/dl and ferritin level is < 12ng/ml. Cobalamin deficiency anemia diagnosed when vitamin B<sub>12</sub> is <200pg/ml. Folate deficiency anemia is diagnosed when folate level is < 2.6ng/ml [5].

## TYPES OF NUTRITIONAL ANEMIA

1. Iron deficiency
2. Folate deficiency
3. Cobalamin deficiency

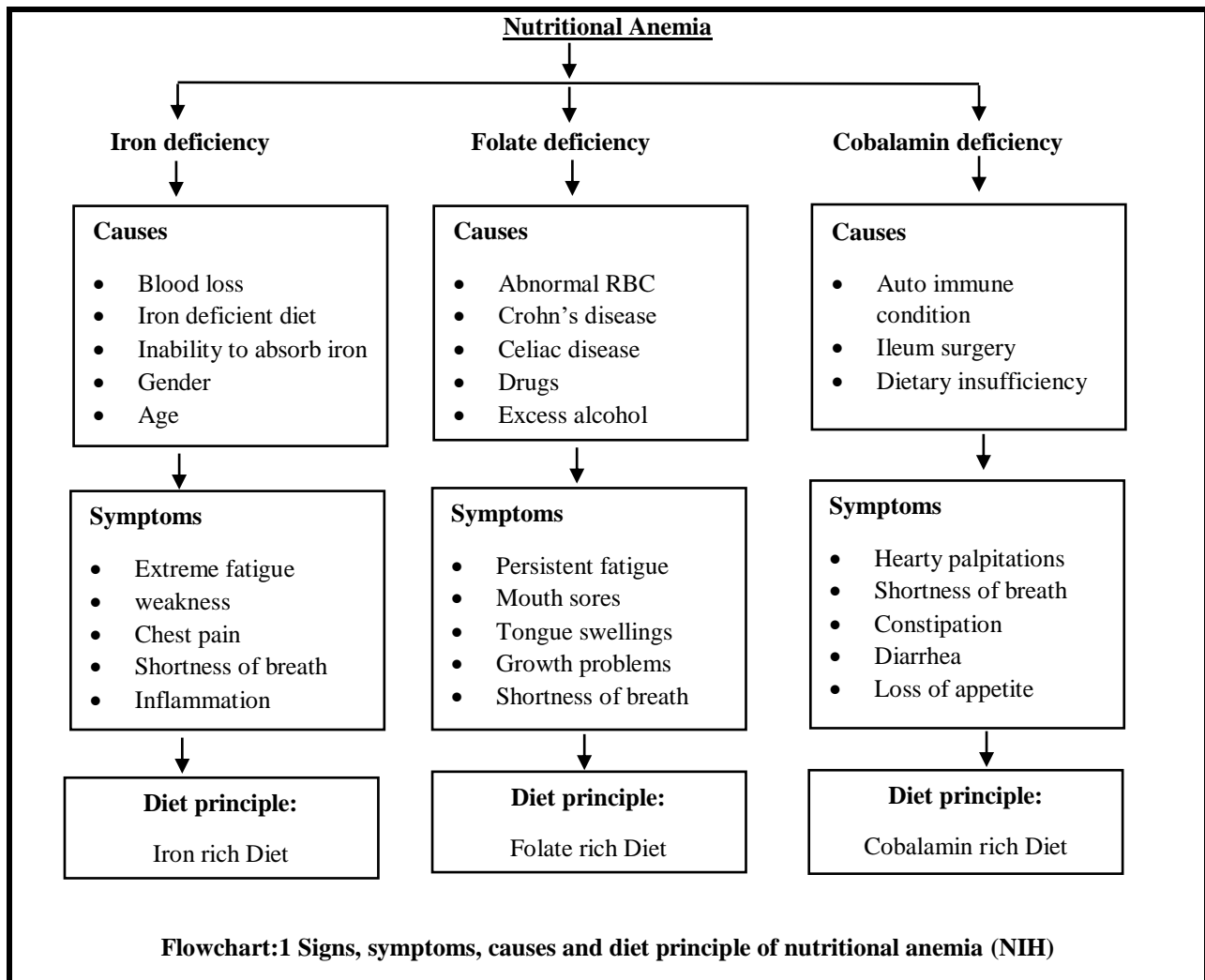
## IRON DEFICIENCY

Iron deficiency refers to the reduction of iron stores that proceeds and persists over progression. Iron is crucial for biological function which includes respiration, energy production, DNA synthesis and cell proliferation.

**CAUSES**

Iron deficiency anemia occurs when the body does not have adequate iron to produce hemoglobin. Hemoglobin being part of the red blood cells which gives colour to blood and enables to carry oxygenated blood throughout the body [6]

- Blood loss
- Lack of iron in diet
- Inability to absorb iron
- Pregnancy
- Gender
- Infants and children
- Vegetarians
- Frequent blood donors

**SYMPTOMS**

The signs and symptoms mostly include extreme fatigue, weakness, pale skin, chest pain, fast heart beat or shortness of breath, inflammation or soreness of the tongue, brittle nails, unusual cravings for non-nutritive substances like ice, dirt or they start having poor appetite especially in infants and children [7].

**DIETARY MANAGEMENT**

- ✓ The recommended daily intake of iron is 1-3mg/day which are gradually increases based on gender and age, the absorption of iron is limited and hence the diet should contain iron in between 15-30mg/day [8]
- ✓ Diet rich in iron has to be given along with vitamin – C rich foods to prevent the low blood iron levels. Foods rich in iron which are red meat, dark leafy vegetables, dried fruits and nuts along with iron fortified cereals have to be given.
- ✓ Food rich in iron are meats like chicken, lamb, egg, beans including soya bean and legumes, pumpkin and squash seed, greens like spinach, sea foods like shrimps, sardines etc.
- ✓ Foods rich in vitamin C like citrus fruits, papaya, pineapple, kiwi, guava, vegetables like broccoli, bell pepper, tomato should be included as they help in absorbing the iron from food [9].

**FOLATE DEFICIENCY ANEMIA**

- ✓ Folate is one of the vitamin-B complex which is also known as folic acid. The decrease in red blood cells due to lack of folate is known as folate deficiency anemia. Folic acid or folate in the body helps in the formation and repair of DNA and to produce red blood cells [10].

**Table:1 RDA of Iron, Folic acid and B<sub>12</sub> by age and gender**

S.no	Group	Particulars	Iron (mg)	Folic acid (µg)	B <sub>12</sub> (µg)
1	Male	Adult	28	100	1
2	Female	Adult	30	100	1
		Pregnant	38	400	1
		Lactating	38	150	1.5
3	Children 0-9years	0-6months	0.27	25	0.2
		7-12months	11		
		1-3y	12	30	0.2-1.0
		4-6y	18	40	
		7-9y	26	60	
4	Adolescent (10-12y)	Boys	34	70	0.2-1.0
		Girls	19		
	Adolescent (13-15y)	Boys	41	100	0.2-1.0
		Girls	28		
	Adolescent (16-18y)	Boys	50	100	0.2-1.0
		Girls	30		

**CAUSES**

The RBC in folate deficiency anemia are abnormally large known as macrocytes which are also called as megaloblasts when seen in the bone marrow. Hence it is also called as megaloblastic anemia.

Some disease affect the absorption of folate in gastrointestinal tract such as crohns disease, celiac disease, certain types of cancer, usage of certain drugs, excessive intake of alcohol cause the folate deficiency anemia [11]

**SYMPTOMS**

The signs and symptoms include persistent fatigue, mouth sores, tongue swelling, growth problems, lethargy, shortness of breath and irritability [12-13]

**DIETARY MANAGEMENT**

- ✓ The Recommended daily intake of folate is 400µg per day, which changes with physiological conditions of the body. In pregnancy, women are advised to take folate supplement as it is crucial for fetal growth.
- ✓ Foods rich in folate are green leafy vegetables like spinach and broccoli, peas, citrus fruits, banana, melons, meat products like poultry, egg, meat lives, chicken lives, eggs beans and legumes have to be included in our diet [14]
- ✓ As folate as a water soluble vitamin and hence not stored in the fat cells. Therefore, folate has to take with food or as supplements of vitamins which include folic acid.

**COBALAMIN DEFICIENCY ANEMIA**

Cobalamin or vitamin B<sub>12</sub> plays an important role as cofactor for two enzymes which are methionine synthase and L-methyl malonyl-coenzyme A mutase. Both cobalamin and folic acid are responsible for megaloblastic anemia. [15]

Reduced number of red blood cells in blood and low levels of vitamin B<sub>12</sub> in both blood and tissue cells is known as cobalamin anemia.

**CAUSES**

It is caused by auto immune condition in which the intrinsic factors are produced and antibodies of anti intrinsic factor inhibits the intrinsic factor leading to inability of B<sub>12</sub> to be absorbed in the gastrointestinal ileum. [16]

Malabsorption in ileum due to condition like crohn's disease and dietary insufficiency especially in vegeterians may have B<sub>12</sub> deficiency. [17]

**SYMPTOMS**

The signs and symptoms include heart palpitations, shortness of breath, pale skin, smooth tongue, constipation, diarrhoea, loss of appetite, flatulence, bloating, nerve problems like numbness or tingling sensation, muscle weakness, etc [18]

**DIETARY MANAGEMENT**

Vitamin B<sub>12</sub> is bound with protein in food is only released after the activity of hydrochloric acid and gastric protease in the stomach (Institute of Medicine)

Food rich in vitamin B<sub>12</sub> are livers of chicken, meats, fish includes salmon and tuna, milk, curds, yogurts, eggs, poultry etc. These foods have to be included in the diet to overcome the B12 deficiency anemia.

**CONCLUSION**

These are different strategies, presentations and complication are associated with different types of nutritional anemia. But the nutritional anemia can be easily treated with fortified foods, supplements and meeting the dietary recommended daily allowances of the vitamins and minerals. But it has been shown that all the types of nutritional anemia are due to some underlying disorders instead of simple dietary insufficiency. If diagnosed accurately and given proper medication dietary requirements, we can easily overcome the nutritional anemia and their symptoms

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**SHORT RUNNING HEAD:** Nutrition deficiency Anemia- A review

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