



IRON DEFICIENCY ANAEMIA IN ADOLESCENT GIRLS AND THEIR MANAGEMENT -A REVIEW ARTICLE

Dr. Ashwini Diliprao Ghuge*¹, Dr. Jyoti Rathod², Dr. S. I. Pathan³ and Dr. S. V. Suryavanshi⁴

^{1,2}(PG Final Yr) Department –Kayachikitsa Department, Gac Nanded. Institute - Govt. Ayurvedic College, Nanded Maharashtra.

³(Guide and Associate Professor) Department –Kayachikitsa Department, Gac Nanded. Institute - Govt. Ayurvedic College, Nanded Maharashtra.

⁴Head of the Department (Dept. of Kayachikitsa) Department –Kayachikitsa Department, Gac Nanded. Institute - Govt. Ayurvedic College, Nanded Maharashtra.

*Corresponding Author: Dr. Ashwini Diliprao Ghuge

(PG Final Yr) Department –Kayachikitsa Department, Gac Nanded. Institute- Govt. Ayurvedic College, Nanded Maharashtra.

Article Received on 18/12/2017

Article Revised on 08/01/2018

Article Accepted on 29/01/2018

ABSTRACT

Nutritional deficiency especially iron deficiency is the most common etiological factor for anemia particularly in adolescent girls when the requirement for iron increases tremendously to physiological need. Adolescence is the period of most rapid growth second to childhood. The physical & physiological changes that occur in adolescence place a great demand on their nutritional requirements & make them more vulnerable to anemia. The daily iron requirement for adolescent girls and premenopausal women is approx. 20 mg element iron. However this amount often is not attained because absorption from dietary sources is limited by the absorptive capacity of the intestine. Iron deficiency occurs readily owing to regular iron losses, increased requirements iron losses or decreased intake. In premenopausal women, cumulative menstrual blood loss is a common cause. vit c deficiency can contribute to IDA by producing capillary fragility, hemolysis and bleeding. Anemia in the adolescent causes reduced physical and mental capacity and diminished concentration in work and educational performance & also poses a major threat to future safe motherhood in girls. The accurate management of this disorder improves the quality of life, improves the symptoms of iron deficiency & lessens the requirement of BT. The treatment option includes oral iron supplement and intravenous iron therapy.

KEYWORDS: Adolescent, Anemia, Iron deficiency, Iron, Nutrition.

INTRODUCTION

Adolescence has been defined by the world health organization as the period of life spanning the ages between 10 to 19 years. This is the formative period of life when the maximum amount of physical, psychological and behavioural changes take place. This is a vulnerable period in the human life cycle for the development of nutritional anemia, which has been constantly neglected by public health programs.

Girls are more likely to be a victim due to various reasons. In a family with limited resources, the female child is more likely to be neglected, she is deprived of good food and education and is utilized as an extra working hand to carry out the household chores. The added burden of menstrual blood loss, normal or abnormal, precipitates the crises too often. This study was planned to highlight the problems of anemia in adolescent females & to study sociodemographic factors related to anemia.

The physical and physiological changes that occur in adolescents place a great demand on their nutritional requirements and make them more vulnerable to nutritional deficiencies. Adolescents are at high risk of iron deficiency & anemia. This is due to rapid pubertal growth with sharp increases in lean body mass, blood volume, red cell mass, which increases iron requirements for myoglobin in muscles and Hb in the blood. Iron requirement increases two to three folds from a preadolescent level of ~0.7 -0.9 mg iron /day to as much as 1.37-1.88 mg iron /day in adolescent bodies and 1.40-3.27 mg iron/day in adolescent girls.

Anemia in adolescence has serious implication for a wide range of outcomes and nearly all of the functional consequences of iron deficiency are strongly related to the severity of anemia. It causes reduced resistance to infection, impaired physical growth & mental development & reduced physical fitness, work capacity & school performance.

Iron deficiency has been recognized as commonest nutritional deficiency disorder of serious public health significance. Most of the physiological functions of the body deteriorate with iron deficiency anemia, thereby disturbing the psychological, developmental, behavioural and work performance in the body.

Ancient seers of Ayurvedic were well aware of this clinical condition and named it as *pandu roga*. According to Ayurveda, it is a clinical entity where *Rakta kshaya* (depletion of blood) causes disturbance of *dhatvagnivyaapar* (metabolic process of the body) resulting in *kshaya of ojus* (the essence of life) and development of nutritional disorder presenting with features of deficiency of blood, fat, *ojas*, looseness of body parts and abnormality of complexion.

Pandu roga is one of the diseases mentioned in *Ayurveda* characterized by the changes in the skin colour to white (*sweta*), yellowish (*pitta*), greenish (*harita*) etc. and is typically characterized by the presence of *ketaki dhulinibha Chaya* (discolouration resembling the colour of the pandanus flowers). The discolouration can also be seen in the sclera. It is one of the "*varnopalakshitaroga*" i.e. disease characterized by the change in the colour.

The clinical features of the *pandu roga* can be compared with the disease anemia. The term Anemia in Greek language means lack of blood or haemoglobin. It is one of the most common disorder in the developing countries because of the poor intake of the iron & folic acid rich foods. The disease is most commonly seen in the childrens, adolescent girls, pregnant women & lactating mothers. Hence program like National Nutritional Anemia control (NNACP) have been taken up by the government of India to control the nutritional anemias. Even now many cases of anemia are recorded every year.

Prevalence of anemia

It has been estimated that the prevalence of anemia in adolescent girls in India is around 56%, which means at any point of time 64 million adolescent girls are suffering from anemia.

In India, various studies conducted in different regions show the prevalence of anemia as follows: Madhya Pradesh 52.5%, Gujarat 37%, Uttar Pradesh 56.3% Andhra Pradesh 77.73%, Tamil Nadu 58.4%, Maharashtra 85.5%, Shimla 21.5%, Karnataka 41.5%.

Types of anemia

As anemia is classified into three degree according to WHO-mild, moderate & severe Hb cut off values of anemia were 10-11.9 g/dl (mild), 7-9.9 g/dl (moderate) & <7 g/dl (severe).

Risk factors for adolescent anemia

- Underweight & malnourished adolescents

- Low dietary intake and increased demands due to growth spurt. Iron requirement peaks in adolescent due to rapid growth spurt & increase in blood volume & lean body mass. The iron requirement increases from preadolescent level to 0.7-0.9 to 1.37-1.88 mg per day for adolescent boys and 1.40-3.27 mg per day for adolescent girls.
- Heavy menstrual blood loss >80 ml.
- Adolescent with chronic illness.
- Hand hygiene and worm infestation in India is also a major contributor of anemia in girls. One study has reported that one third of girls. One study has reported that one third of girls have worm infestation & prevalence of anemia is almost double in the girls as compared with girls who were not having worm infestations.
- Obese and overweight adolescent iron deficiency in these individuals may be due to low quality food & increased body requirements due to increased weight.

The most important factors determining iron deficiency anemia

- An inadequate diet, with poor iron, micronutrient and vitamin content leading to an insufficient intake of nutrients such as iron folic acid, vit A vit B12 & vit D. Multiple micronutrient deficiencies are still common worldwide & may be present at any age hampering both physical & cognitive development.
- The use of medications food that inhibit iron absorption including antacids, NSAID etc.
- Overweight and obesity The prevalence of overweight & obesity has increased significantly in childrens & adolescent & in these individuals iron deficiency may be related to a micronutrient poor, calorie rich diet to a greater need for iron that is associated with body weight to genetic factors and /or to sedentariness. Furthermore, overweight & obesity leads to a continuous inflammatory process intensifying anemia & hampering treatment.
- Malnutrition, when in addition to an inadequate diet, there are other possible associated conditions such as malabsorption syndrome and/or excessive iron loss, flattening or atrophy of the intestinal villi, hampering micronutrient absorption.

The influence of hormones as a cause of anemia in adolescence

- In adolescence, haemoglobin levels are admittedly higher in males than in females because prostaglandins (PGE) facilitate erythropoietic activity, both directly androgens stimulate erythropoietic action by increasing or facilitating its production in the erythroid stem cells conversely, estrogen inhibit the effects of erythropoietin.
- Due to changes in the nutritional requirements of adolescent at menarche in girls and as a result of the hormonal changes at puberty in boys hemoglobin levels differ as a function of gender, age or stage of sexual maturity.

- In women of reproductive age menstrual bleeding defines anemia, women in whom menstrual bleeding is excessive, either with respect to the number of bleeding days or to the amount of flow and the occurrence of menstrual clots.

Adverse effects of Anemia in Adolescent

As adolescent age is the formative years for development of anemia at this stage of life has some long term consequences such as-

- Stunted growth
- Poor school performances, reduced attention span, memory loss, increased school dropout rate.
- Reduced immunity & increased infection rate.
- Delay in onset of menarche and menstrual irregularities if already attained.
- If anemic girl becomes pregnant, chances of intrauterine growth restriction, low birth weight, increased perinatal morbidity & mortality and also increased maternal morbidity & mortality.
- Directly or indirectly it affects the national and economic growth as well. It can have economic implications and assessment, prevention & control.

Diagnostic approach

Diagnosis is based on three different aspects, a complete history of the patient, focussing on possible signs & symptoms. A detailed physical examination also taking the patient's sexual maturation into consideration & laboratory tests.

In the majority of cases, the onset of anemia is insidious with symptoms appearing gradually. The principal symptoms are pallor, fatigue, dyspnoea, on exertion, tachycardia, palpitations, physical debility, irritability, anorexia, headache, paresthesia, retarded growth, papillary atrophy of the tongue, koilonychia, cheilosis, swollen limbs, changes in appetite, mood changes, attention disorders and poor school performances.

To diagnose iron deficiency anemia, a full blood count must be performed & serum ferritin levels must be measured.

When iron is deficient the body initiates turns to its iron stores, consequently depleting them. At this stage that ferritin levels fall, however there are no functional abnormalities at this point, net serum iron levels decrease, transferrin saturation diminishes & iron binding capacity increases.

Recommendations

The overall prevalence of anemia among adolescent suggests a need

- Encourage & guiding them to take iron rich diet.
- To develop strategies for intensive adult education
- To improve the socio economic status of the population through poverty alleviation programs.

- This should be supported by programs for the prevention of anemia among adolescent girls through nutrition education & anemia prophylaxis.
- Prevention of worm infestation
- Screening of target groups for anemia.
- Referring anemic girls to appropriate health facility.

Treatment

- Counselling them for correction of anemia through iron rich diet.
- Deworming 6 monthly with the help of tablet.
- Prescribing iron supplements 60 to 120 mg per day with vit c.
- Iron supplements can cause constipation so doctor may also recommend that stool softener.
- In cases of confirmed anemia, iron treatment should continue for at least 2 to 3 months or 6 months.
- If after 4 weeks also, anemia does not respond in spite of iron rich food intake & adhering to treatment further evaluation is required.
- If iron deficiency anemia is severe, it may need iron given intravenously or may need blood transfusion to help replace iron and haemoglobin quickly.

REFERENCES

1. World Health Organization programming for adolescent health and development. WHO Tech Rep Ser No., 1996; 2.
2. Chaudhary S, Dhage V.A study of anemia among adolescent females in urban area of Nagpur, Indian J comm med, 2008; 33(4): 243-5.
3. Thomas D, Chandra J, Sharma S, Jain A, Pemde HK. Determinants of nutritional anemia in adolescents. Indian paediatrics, 2015; 52(10): 867-9.
4. Adolescent nutrition, Unicef India, 2013. Available at <http://unicef.in/whatwedo/33/Adolescents-Nutrition>.
5. Biradkar S, Biradkar S. prevalence of Anemia among Adolescent Girls: A one year cross sectional study, J Clinic Diagnost Res, 2012(suppl-1); 6(3): 372-7.
6. Beard JL. Iron requirements in adolescent females. The J nutri, 2000; 130(2): 440S-2S.
7. Kulkarni MV, Durge PM, Kasturwar NB prevalence of anemia among adolescent girls in an urban slum. National J Comm Med, 2012; 3(1): 108-11.
8. Silva FC, Vitale MSS, Quaglia EC, Braga JAP, Medeiros EHGR. proporcao de anemia de acordo com o estadiamento puberal, Segundo dois criterios diagnosticos. Rev Nutr Campinas, 2007; 20(3): 297-306.
9. Mesias M, Seiquer I, Navarro MP. Iron nutrition in adolescence. Crit Rev Food Sci Nutr, 2013; 53(11): 1226-37.
10. Nathan GD, Orkin SH. Appendices-Reference values in infancy and childhood. In: Orkin SH, Nathan DG, Ginsburg D, Look AT, Fisher DE, Lux SE, editors. Nathan and Oski's hematology of infancy and childhood, 5th ed. Philadelphia: WB Saunders: 1998.

11. Orkin SH, Nathan DG, Ginsburg D, Look AT, Fisher DE, Lux SE. Nathan and Oski's hematology of infancy and childhood 7th ed. Philadelphia, PA: Saunders, 2009; 911-1015.
12. Reeves JD, Yip R, Kiley VA, Dallman PR. Iron deficiency in infants: the influence of mild antecedent infection. *J Pediatr*, 1984; 105(6): 328-38.
13. Kurpad AV, Edward BSA, Eberli I. Micronutrient supply and health outcomes in children. *Curr Opin Clin Nutr Metab Care*, 2013; 16(3): 328-38.
14. Nead KG, Halterman JS, Kaczorowski JM, Auinger P, Weitzman M. Overweight children and adolescents: a risk group for iron deficiency. *Paediatrics*, 2004; 114(1): 104-8.
15. Merckel D, Huerta M, Grotto I, Blum D, Tal O, Rachmilewitz E et al. Prevalence of iron deficiency and anemia among strenuously trained adolescents. *J Adolesc Health*, 2005; 37(3): 220-3.
16. Hoffbrand AV, Moss PAH, Pettit JE. *Fundamentos em Hematologia*. 5th ed. Artmed: Sao Paulo, 2006.
17. Rockey DC. Occult gastrointestinal bleeding. *Gastroenterol Clin North Am*, 2005; 34(4): 699-718.
18. Braga JAP, Vitale MSS. (Iron deficiency in infants and children). *Rev Bras Hematol Hemoter*, 2010; 32: (supl.2): 38-44.
19. Ballard L, Lyon DS, Jones JL. Patients with menorrhagia: etiologies, treatments and outcomes. *South Med J*, 2000; 93(6): 571-4.
20. Temoteo TL. Diagnostico de anemia e fatores determinantes em escolares da rede pública de ensino de Teresina Universidade Federal de Piauí-UFPI. Pro Reitoria de Pesquisa e Pós – Graduação, Prppg programa de pós-Graduação em Alimentos e Nutrição, PRPPG. Tese de Mestrado, 2012.
21. Vitale MSS. perspectivas históricas. In: Braga JAP, Amancio OMS, Vitale MSS. O ferro e a saúde das populações. Sao Paulo: Roca, 2006; 1-7.
22. Dallmann PR, Reeves JD. Laboratory diagnosis of iron deficiency. In: Stekel A, editor. Iron nutrition in infancy and childhood. Nestlé Nutrition Workshop Series, 4. New York: Raven Press, 2001; 11-44.
23. Wowwood M. The laboratory assessment of iron status - an update. *Clin Chim Acta*, 1997; 259(1-2): 3-23.
24. Paiva AA, Rondo PHC, Guerra-Shinohara EM. Parameters for the assessment of iron status. *Rev Saude Publica*, 2000; 34(4): 421-6.
25. Longo KH. Aporte dietético de leite enriquecido com ferroaminoácido quelato em crianças com anemia ferropriva (monografia). Erechim, RS: Faculdade de Farmácia Universidade Regional Integrada (URI), campus de Erechim, 2005.
26. Aguiar CD. Perfil hemoglobínico pós – suplementação com leite fortificado com ferro em crianças anêmicas em Erechim/RS (monografia). Erechim RS: Universidade Regional Integrada (URI), campus de Erechim, 2006.