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### **A Brief Review on Iron Deficiency Induced Anaemia in Adolescent Age Group and its Management by Dietary Substances**

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#### **ABSTRACT**

Anemia means that the blood does not have enough red blood cells and/ or hemoglobin concentration. Anemia in the adolescence causes reduced physical and mental capacity and diminished concentration in work and educational performance, and also poses a major threat to future safe motherhood in girls. The physical and physiological changes that occur in adolescents place a great demand on their nutritional requirements and make them more vulnerable to anemia. Women have hormonal changes in the body during the different stages of life like adolescence, pregnancy, lactation and menopause. Uterine fibroids also cause heavy bleeding in affected women leading to iron deficiency anemia. During all these phases, demand for iron is increased and that must be fulfilled. If not, they tend to suffer from chronic iron deficiency anemia.

**KEYWORDS :** Anemia; Adolescence; Panduroga; Iron deficiency

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## INTRODUCTION

Adolescence is the period of most rapid growth second to childhood. The word 'adolescent' is Latin in origin, derived from verb adolescence, which means "to grow into adulthood". Literal meaning of adolescence is period of physical, physiological and psychological development from the onset of puberty to maturity. Anemia is a condition in which the number of red blood cells and/or hemoglobin (Hb) concentration observed to be reduced.<sup>1</sup> It is a global public health problem affecting the developing as well as developed countries that has major negative impact on human health and consequently on social and economic development. It affects 24.8% of the world population.<sup>2</sup> Causes of anemia in developing countries are noticed multi-factorial, which include nutritional (iron, folate, and vitamin B12) deficiencies, infections (such as malaria, intestinal parasitic infection), and chronic illness.<sup>3</sup> The prevalence of iron deficiency and subsequent anemia increases at the start of adolescence as adolescence is an important period of nutritional vulnerability having increased nutritional demands because of excellent growth and development during this phase.. Due to intense growth and muscle development which resulted an increase in blood volume, the iron requirement is comparatively high. In case of girls, anemia is caused by increased requirements of nutrition for growth, exacerbated a few years later by the onset of menstruation.<sup>4</sup> The physical and physiological changes occurred in adolescents has high demand of nutrition requirements and make them more vulnerable to nutritional deficiencies. Adolescents are at high risk of iron deficiency and anemia. This is due to rapid pubertal growth with sharp increase in lean body mass, blood volume, and red cell mass, which increases iron requirements for myoglobin in muscles and Hb in the blood. Moreover in girls, menstrual disorders too, play a significant role to produce Anemia. Iron requirement increases two- to threefolds 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 boys and 1.40–3.27 mg iron/day in adolescent girls.<sup>4, 5</sup> <sup>6</sup>Anemia in adolescents and young adults can have negative effects on their cognitive performance and growth. It is generally expected that rural, less educated individuals will have higher levels of nutritional deficiencies, including iron deficiency and anemia, either because they do not have the means to achieve a healthy diet, do not have access to medical or nutrition services to prevent or treat these conditions, or have greater levels of infection and disease, increasing their risk of nutritional deficiency. Anemia has a major detrimental effect on women's health which increases the risk of death or disease of both the mother and the child. In India, anemia is by far the most significant factor of maternal mortality (MMR), that is death from pregnancy and childbirth related causes. Every year, more than 100,000 women die because of this in India. As per an estimation, 40% of these maternal deaths are due to the anemia and anemia- related complications.<sup>7</sup>

Iron deficiency induced anemia is a problem of serious public health significance, in terms of its impact on psychological and physical development, behavior and work performance. It is the most prevalent nutritional problem in the world today affecting more than 700 million people. In simple word iron deficiency occurs when an insufficient amount of iron is absorbed to meet the body's requirements. This insufficiency may be due to inadequate iron intake, reduced bioavailability of dietary iron, increased need for iron, or to acute or chronic blood loss when prolonged iron deficiency leads to iron deficiency anemia. Iron deficiency is common most nutritional cause of anemia.

In Ayurveda, Panduroga is correlated as anemia and it is Pitta predominant disease. In Ayurveda, diet has been given extreme importance. It plays an important role for maintenance of life. Among three supporting factors of life, the Ahara (diet), Nidra (sleep) and Brahmacharya, the diet is an essential factor for maintenance of healthy life. Acharya Charaka has mentioned that, Anna (diet) is the best sustainer of life (Ch.Su.25/40). An adequate or balanced diet provides all the essential nutrients in sufficient quantities to meet bodily needs. Adolescents need a plan to select an adequate diet. Applied to iron deficiency, efforts should be directed towards promoting the availability of and access to iron-rich foods. Some iron rich foods include animal meats like beef, chicken and fish and plant foods such as legumes and green leafy vegetables. Prevention of iron deficiency anemia requires approaches that address all the potential causative factors. Interventions to prevent and correct iron deficiency anemia therefore must include measures to increase iron intake through food based approaches, namely dietary diversification and food fortification with iron; iron supplementation and by improved health services and sanitation.

### **Dietary Sources of Iron that prevent Iron deficiency Anaemia**

It is important to differentiate between supplementation preventing anemia by correcting iron deficiency before iron deficiency induced anemia, and therapeutic supplementation, correcting established iron deficiency anemia. Consumption of iron rich diet is essential for prevention iron deficiency induced anemia. A few iron rich foods are enlisted below in table 1.

Table 1: Iron rich food in mg/100g<sup>8,10</sup>

Food Stuffs	Iron mg/100g	Food Stuffs	Iron mg/100g
<b>Cereals</b>		<b>Green leafy vegetables</b>	
Bajra (Pearl millet)	8.8	Amaranthus tender	21.4
Barley (Jau)	3.7	Coriander	10.0
Cholam (Sorghum)	6.2	Drumstick	7.0
Maize yellow	2.1	Mint	15.6
Oatmeal (Dalia)	3.8	Radish leaves	4.8
Ragi (Finger millet)	5.4	Spinach	5.0
Rice, Paraboiled milled	3.7	<b>Fruits</b>	
Rice, raw milled	2.8	Pine apple	1.2
<b>Legumes</b>		Grapes	1.5
Bengal gram dal	8.9	Lemon	2.3
Black gram dal	9.8	Banana	0.9
Cow gram	3.8	Pomegranate	0.3
Field bean dry	5.0	Apple	1.0
Green gram dal	8.4	Pear	0.5
Red gram dal	8.8	Orange	0.32
Soyabean	11.3	Mango	0.3
<b>Nut and Oil Seeds</b>		Guava	1.0
Sesame seeds	10.5	<b>Meat and eggs</b>	
Cashew nut (Kaju)	5.0	Egg	2.1
Ground nut (Pea nut)	1.7	Fish	2.3
Almond nut (Badam)	3.7	Goat liver	6.3
Pistachions (Pista)	14	Goat mutton	2.5
		Meat (beef)	3.1
		<b>Miscellaneous foods</b>	
		Jaggery (Gud)	11.4

Consumption of food rich in iron is essential for prevention of iron deficiency anemia. Iron requirements of the adolescent increase during the pubertal growth spurt.

## DISCUSSION AND CONCLUSION

Iron deficiency anemia is common globally and 25% of the population is affected by iron deficiency and the most common groups affected are children of age 4-24 months, adolescent girls, schoolchildren, pregnant and breastfeeding women.<sup>9</sup> Menarche the first menstrual bleeding in young girl and menstrual abnormalities in adolescents, in combination with an inadequate diet is common cause of iron deficiency resulting anemia in women of reproductive age. Iron deficiency induced anemia is a problem of serious public health nutritional deficiencies affecting various social and socio economic strata. Dietary modifications are strictly required to improve overall dietary intakes in form of iron, folic acid and vitamin C rich foods promoting iron absorption. Therefore, in order to restore normal levels of hemoglobin and iron preventing iron deficiency anemia in the vulnerable population, then nutrition education along with iron supplementation with natural sources of vitamin C is the best strategy.

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