

Iron deficiency Anaemia: Impaired cognitive, behavioral and psychomotor development

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Food we eat influences our memory, comprehension, thinking, judgement, intelligence and emotions. Iron deficiency is the most common and widely prevalent disorder affecting at least one third of world's population. In 42% of children and 50% of women, anaemia is caused by iron deficiency. Infant, toddler, adolescents and pregnant women are main risk population because of their high requirement.

Iron is required for brain development, myelination, tissue proliferation and cell mediated immunity. Early life iron deficiency affects 3 major Neuro behaviour domains including, speed of processing, feelings and learning as well as memory. Mechanisms include longterm alterations in dopamine metabolism, myelination and hippocampus structure as well as function. Longterm effects studies showed effects such as slower speed of processing, reduced learning and memory, poor social interaction and poorer motor coordination. There is positive correlation between serum iron levels and IQ scores in school aged children.

MRI studies showed that iron deficiency during early years of life will leads to metabolic changes in hippocampus and frontal lobe of cortex, decrease myelin content and decrease number of oligodendrocytes in brain. Iron deficiency also affects neurotransmitter function. Behavioural changes in IDA include listlessness, wariness, fatigue and poor emotional regulation. Anaemic children have difficulty regulating emotions, apt to act out aggressively and have problems delaying gratification. Iron deficiency in infancy is associated with altered neural correlates of recognition memory at adolescent age. IDA in infancy is related to excessive alcohol use and risky sexual behaviour in adolescence through its effects on poor emotion regulation in childhood. Early life iron deficiency results in Neuro developmental alterations that persist even after iron replenish. Common causes of IDA are decrease intake (Delayed weaning, cows milk, malnutrition, iron poor diet, GI surgery) and increase losses (Malaria, hookworm infestations, peptic ulcer, chronic diarrhoea).

Iron stores of newborn baby is around 75 mg per kg, which depletes by 6 months of age in term babies and even prior in low birth weight babies. So, dietary recommendations for infants suggest supplemental iron starting (1 mg/Kg) at 4 to 6 months of age. Low birth weight babies require to start iron supplement starting at 1 month of age (2 mg/Kg) and should be continued upto 12 months. Treatment of IDA includes eradication of underlying cause, correction of anaemia with either iron therapy or blood transfusions and well balanced diet. Children aged 12 to 36 months should be encouraged to eat iron rich foods and vitamin C as it increases iron absorption. Avoid taking tea along with iron rich foods as it decrease iron absorption. Nutritional interventions during pregnancy and first year of life have positive effects on human capital formation and may increase productivity; therefore, may impact socioeconomic development.