EDITORIAL

Can We Eliminate Anaemia from India?

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Anaemia, as defined by low haemoglobin concentration, is a condition in which the number of red blood cells or their oxygen-carrying capacity is insufficient to meet physiologic needs. It is a major public health problem that affects low, middle and high-income countries. The global prevalence of anaemia is 42.6% in children, 38% in pregnant women and 29.4% in all women of reproductive age. The prevalence of severe anaemia amongst women and children is in the range of 0.9% to 1.5% and is associated with substantially worse health outcomes (1).

In India, the recent National Family Health Survey (NFHS)-4 conducted in 2015-2016 found anaemia as a severe public health problem (>40% prevalence) in all vulnerable age groups namely children age 6-59 months (58.4%), women of reproductive age 15-49 years (53.1%) and pregnant women (50.3%) (2). An insignificant decline has been observed in the prevalence of Anaemia over a decade during the intervening period of NFHS-3 (2005) to NFHS-4 (2015). Only a reduction in 10.9% in children age 6-59 months (69.4% to 58.5%), 2.1% in women of reproductive age 15-49 years (55.2% to 53.1%), 7.6% in pregnant women (57.9% to 50.3%) was observed (2,3).

Anaemia has been associated with poor cognitive and motor development outcomes in children. Iron-deficiency Anaemia (IDA) causes alterations to brain structure and function, which may be irreversible even with iron treatment, particularly if the deficiency occurs during infancy when neurogenesis and differentiation of different brain regions are occurring. IDA affects the capacity of red cells to carry oxygen to tissues which leads to poor physical activities and physical performance. Anaemia during pregnancy has been associated with poor maternal and birth outcomes, including premature birth, low birth weight and maternal, perinatal and neonatal mortality and increases the susceptibility to infections (1). In India, the lifetime costs of iron-deficiency Anaemia between the ages of 6 and 59 months is amounted to 8.3 million disability-adjusted life-years (DALYs) and annual production losses of US$24 billion in 2013 (corresponding to 1.3% of GDP) (4).

Reasons for continued high prevalence of Anaemia

Anaemia develops through three main mechanisms: ineffective erythropoiesis (when the body makes too few red blood cells), haemolysis (when red blood cells are destroyed) and blood loss. The three most common etiological factors of Anaemia are i) Nutrient deficiencies, ii) Diseases and iii) Genetic haemoglobin disorders. **Nutrient deficiency anemias:** result when the intake of certain nutrients is insufficient to meet the demands for synthesis of haemoglobin and erythrocytes. Deficiencies of iron, vitamins A, B2 (riboflavin), B6 (pyridoxine), B12 (cobalamin), C, D and E, folate and copper can also result in Anaemia, owing to their specific roles in production of haemoglobin or erythrocytes.

Diseases: Infectious diseases can cause Anaemia through multiple mechanisms, including impaired nutrient absorption and metabolism, ineffective erythropoiesis, or increased nutrient losses. Acute and chronic infections can also contribute to Anaemia of chronic inflammation. During infection, pro-inflammatory cytokines alter iron metabolism so that iron is sequestered in stores as ferritin, and the production and lifespan of red blood cells is reduced. The common infections like malaria, tuberculosis, HIV and parasitic infections contribute to Anaemia through this mechanism. **Genetic haemoglobin disorders:** Structural variation or reduced production of the globin chains of haemoglobin can also result in Anaemia (1). Roughly 5% of the global population is estimated to carry a significant haemoglobin variant and the percentage is much higher in Africa (18%) and Asia (7%) (5).

Scientific evidence suggests that the aetiology of anaemia is multi-factorial. However, our present policy is mainly on combating iron and folate deficiency by distribution of Iron and Folic Acid (IFA) tablets to beneficiaries (6). The coverage of beneficiaries with IFA is low. as per the NFHS- 4 survey (2). The consumption of 100 IFA supplementation ranged from 4.4% in Nagaland to 82.1% in Lakshadweep.

The available meta-analyses suggest that iron supplementation could increase the mean blood haemoglobin concentration by 8.0 g/L (95% Confidence Interval (CI): 5.0—11.0) in children, 10.2 g/L (95% CI: 6.1—14.2) in pregnant women and 8.6 g/L (95% CI: 3.9—13.4) in non-pregnant women (Table 1). Applying these shifts to estimated blood haemoglobin concentrations, indicates that about 42% of Anaemia in children and about 50% of Anaemia in women would be amenable to iron supplementation (1)

TABLE 1: ESTIMATED PERCENTAGE (95% CI) OF ANAEMIA THAT IS AMENDABLE TO IRON SUPPLEMENTATION

WHO region	Children (6–59 months)	Non-pregnant women (15–49 years)	Pregnant women (15–49 years)
African Region	32 (30 to 34)	41 (36 to 46)	44 (42 to 47)
Region of the Americas	56 (48 to 63)	55 (44 to 62)	60 (52 to 68)
South-East Asia Region	41 (34 to 54)	45 (35 to 53)	47 (42 to 54)
European Region	54 (44 to 65)	55 (46 to 61)	62 (54 to 71)
Eastern Mediterranean Region	38 (33 to 43)	45 (39 to 50)	49 (46 to 54)
Western Pacific Region	64 (46 to 73)	59 (44 to 70)	61 (49 to 72)
Global	42 (38 to 46)	49 (43 to 53)	50 (47 to 53)

Only approximately 50% of cases of anaemia can be considered to be due to iron deficiency. Also the proportion of anaemia due iron deficiency varies in different populations depending on the local conditions. The proportion of anaemia associated with iron deficiency is lower in countries where Anaemia prevalence was >40%, such as India, especially in rural populations. Where only 14% for pre-school children and 16% for women of reproductive age in rural India may have anaemia due to Iron Deficiency. (7).

To eliminate anemia we need to have three pronged interventions consisting of Prevention and Control of i) Nutrient deficiencies, ii) Diseases and iii) Genetic haemoglobin disorders. Presently, the main intervention which is being implemented in our country is with the assumption that the main cause of anaemia is iron deficiency. However, this is not true. More than 50% mothers and children are suffering from anaemia, but we in India continue to provide only prophylaxis doses of iron, when these groups need therapeutic doses of iron. We need to implement evidence based interventions in different regions of the country as the determinants of anemia may differ like the hookworms infestation/ malaria/ micronutrient supplementation/ reduction in enteropathic inflammation. The other issues which require immediate attention are i) High priority to anaemia control programme (instead of episodic) ii) Higher funds allocation iii) High priority in implementation and monitoring iii) Ensuring availability of supplies and distribution of IFA tablets at the village/ urban ward level iv) Counselling to

beneficiaries on benefits of consumption of IFA tablets, Health consequences of Anaemia and Importance of Dietary Diversity, v) Generating the evidence to understand the regional specific determinants of anaemia.

A National Expert Group Technical Consultation on Prevention and Treatment of Iron Deficiency Anaemia in India is being organised under aegis of Ministry of Health and Family Welfare with following objectives: i) To evaluate the congruence between the recent WHO guidelines for Iron Supplementation (8-12) and National Iron Plus Initiative (NIPI) guidelines (6) ii) To suggest potential modifications in the NIPI guidelines, if required iii) To examine the role of iron fortification of food for combating Anaemia in India. In this issue of the journal, the "state of art" manuscripts which have been developed to discuss the above issues, have been published. We are sure that the evidence developed in these publications will help Policy makers, Health Planners and Scientists in developing strategies for combating anaemia in the country.

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