Prevalence of Anemia in Adolescents: A Challenge to the Global Health

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Abstract

Iron deficiency anemia is a major global health problem affecting more people than any other condition, constituting a public health challenge of epidemic proportion. Anemia with major consequences on health and well-being in women increases the risk of maternal and neonatal adverse outcomes. WHO estimated that 24.8% of the global population is affected with anemia. The highest prevalence of 47.4% is in preschool-age children and the lowest prevalence of 12.7% is in men [1]. However, the population group with the greatest number of individuals affected is non-pregnant women amounting to 468.4 million. WHO reported prevalence of anemia to be highest in South Asia and Central and West Africa. Although considerable reductions in the prevalence of anemia have been achieved through various policies and intervention programmes, to combat and reach the fifty percent reduction target more pragmatic efforts are needed [2]. In this review the prevalence of anemia across the globe, its causes, risk factors, and the intervention measures to combat anemia has been discussed.

Keywords: Anemia; Health; Prevalence; Adolescents; Pregnant Women

Introduction

Anemia is a global public health problem which is worse in developing countries mainly because of malnutrition, infectious disease and parasitic infections. As iron deficiency anemia (inadequate amount of red blood cells caused by lack of iron) is not only highly prevalent in less-developed countries, but also remains a noticeable problem in developed countries too, where other forms of malnutrition have already been virtually eliminated. Iron deficiency is not the only cause of anemia, but where anemia is prevalent; iron deficiency is usually the most common cause. Anemia afflicts an estimated two billion people worldwide. Though several studies have summarized the prevalence, severity and burden of anemia there is a wide variation in the estimates of anemia around the world. This differential estimation is due to vast variation in methodological approaches, indicators or measures to track and assess the prevalence of anemia across varied communities.

According to the World Health Organization (WHO) [1] about 30% of the world population was anemic in 1985 and about 37% of women were anemic during 1992. In 2008 WHO reported 24.8% of the world's population is affected by anemia, of whom 42% were pregnant women, 30% non-pregnant women, and 47% were preschool children [1]. In their study Kassebaum., *et al*. [3], reported the global anemia prevalence at 32.9% in 2010.

A 2011 WHO study estimated global anemia prevalence to be 496 million of non-pregnant women and 32.4 million of pregnant women aged 15 - 49 years [4]. It is estimated that half a billion women of reproductive age worldwide are affected by anemia causing almost twenty percent maternal death directly [5]. Thus emphasizing the need to address this problem in order to ensure health and well-being of women of child bearing age particularly of adolescent girls (the future mothers). It is a matter of great concern that despite the huge growing adolescent girl's population, the health needs of adolescents have neither been researched nor addressed adequately. It is estimated by United Nation's population Fund that 21.9% of India's total population belonged to the adolescent age group and the world adolescent females population to be 9.9% [5]. UNICEF observed that more than half of population of adolescent girls in India is anemic and its proportion is higher

than the least developed countries like Sub Saharan Africa [6]. The highest number of individuals affected by anemia are non-pregnant women aged 15 - 49.9 years mainly due to nutritional deficiencies (WH0, 1993-2005) [1]. Several studies on prevalence of anemia reported the prevalence of anemia in India to be between 46% to 88% showing a vast range due to non-uniform haemoglobin estimation methods [7]. Very few studies have adopted the standard methods for estimation of haemoglobin, thus calling for a uniform standardized prospective study of general population including vulnerable subgroups.

Adolescents especially girls are most vulnerable towards the problem of anemia and when they grow in age this adverse health tendency continue to persist and impairs the health and well-being of women population and increase the risk of maternal, neonatal adverse outcome and child mortality [8]. WHO has defined adolescent stage as life spanning the ages between 10 - 19 years and a period of life marked by specific developmental attribute such as rapid physical growth and development, physical, social and psychological maturity [9]. Increased iron demands during this stage of growth, excessive menstrual losses and nutritional deprivation, all aggravate and exacerbate preexisting anemia and its ill effects [10]. Public health strategies to prevent and control anaemia in this stage is essential to prevent prenatal and maternal mortality, low birth weight as well as the prevalence of disease later in life [4].

It is therefore recommended that adolescent girls must be screened to detect and check the influencing factor of anemia. The high risk adolescent girls need to be considered for close follow-ups for modification of risk factors. They must be advised on life style changes by means of proper diet, self-care, regular exercise and weight gain. Appropriate health education need to be imparted at home and school so that these risk factors can be eliminated in early stages itself. Health-care professionals and policy makers should play a key role prioritizing the plan of action in the prevention of anemia and its related risk factors. The ultimate challenge is to meet the goal and to reach the global nutrition targets of 50% reduction of anemia in women of reproductive age. In the long run these measures will meaningfully contribute to develop nations' economic growth, health, wealth and well-being [4].

Anemia

Anemia is not a disease but a condition in which the hemoglobin content of blood is lower than normal as a result of deficiency of one or more essential nutrients particularly iron, which is essential for the formation of haemoglobin. Anemia in any condition is characterized by an abnormal decrease in total blood red blood cell mass resulting, reduction in concentration of hemoglobin of blood on red blood cells mass. The lower haemoglobin level and insufficient number of red blood cells due to lack of iron reduces the oxygen carrying capacity to various tissue, impairs brain development, physical work capacity and regulation of body temperature [11]. Many studies have shown that anemia directly affect the physical as well as mental abilities of individuals

WHO has classified anemia into three categories: mild (11.0 - 11.9 g/dl), moderate (8.0 - 10.9 g/dl) and severe (< 8 g/dl) anemia [10]. UNICEF classified anemia to be mild in children, adolescent girls and pregnant women if the Hb level in blood is between 8.0 and 10.99 g/dl among children, 10.0 to 11.99 g/dl among adolescent girls and 8.0 - 10.99 g/dl Hb level among pregnant women. For severely anemic the Hb level should be below 5.0 g/dl among children, 8.0 g/dl among adolescent girls and 5.0 g/dl among pregnant women. Accordingly moderate anemia is denoted when the Hb level is between mild and severe anemia [12].

Level of Hemoglobin for Anemia According to UNICEF

Anemia level	Hemoglobin Level		
	Children	**Adolescent Girls**	**Pregnant women**
Mild	8.0 - 10.99 g/dl	10.0 - 11.99 g/dl	8.0 - 10.99 g/dl
Moderate	5.0 - 7.99 g/dl	8.0 - 9.99 g/dl	5.0 - 7.99 g/dl
Severe	Below 5.0 g/dl	Below 8.0 g/dl	Below 5.0g/dl

Source: IIPS, 2006

Stages of anaemia

According to Herbert [13] the deviations from normal iron status to the anemic stage has been categorized in four stages. In stage 1 due to reduced iron absorption, moderate depletion of iron stores starts and in 11th stage there will be negative iron balance as severe depletion of iron stores starts. Though iron stores are low in these stages dysfunction does not occur. If intervention starts during these stages, dysfunction may be avoided. In negative iron balance, Iron deficiency during Stage III anemia is not accompanied by dysfunction; however, in stage IV negative iron balance is characterized by inadequate body iron, causing dysfunction as well as anemia.

Causes of Anemia

Anemia is the result of variety of causes, and some times more than one cause is involved. The most significant contributor to the onset of anemia is iron deficiency. The prevalence of anemia has often been used as a proxy for iron deficiency anemia (IDA). Iron de-ficiency anemia and anemia are often used synonymously, as more than 50% of the cases of anemia are due to insufficient iron intake [14], the proportion may vary depending among different groups and areas according to local conditions As explained already, Iron-deficiency anemia, progresses through different stages of iron deficiency beginning with iron depletion, which if not corrected, will eventually lead to IDA.

The main causes for iron deficiency anemia include low dietary intake of iron, poor absorption of iron from diets due to presence of phytate or phenolic compounds in the diet [15]. There are stages of life when requirement of iron are especially high during childhood and adolescent growth and pregnancy. This is because the need for iron increases during these times of growth and development. Other major causes may be attributed to malnutrition, intestinal infestations, reduced intake of nutrients and inherited factors, secondary disease, poverty, poor hygiene, medication, alcohol, Lack of iron usually is also due to heavy blood loss as a result of menstruation, or parasite infections such as hookworms, ascaris, and schistosomiasis. All these condition lowers blood haemoglobin (Hb) concentrations and hence causes anemia.

Risk Factors

Anemia has serious negative consequences on over all national development. The prevalence of anaemia is an indicator of both poor nutrition and poor health of nation.. Iron deficiency anaemia is listed in "top ten" risk factors contributing to the global burden of diseases. It is the most common cause of increased risk of maternal and child mortality, also increases the chances of foetal deaths, abnormalities, preterm and under weight babies [16].

In addition, the negative consequences of IDA on cognitive performance leading to a deficit of five to ten points in intelligence quotient (IQ) [17]. It also affect physical development, language skills, motor skills and coordination among infant and young children and physical development of children. It also impact the immune system and increases the chances of infections and inflammatory disease, leading to fatigue, weakness, lethargy, shortness of breath, Pain, discomfort, anxiety, depression and decreased concentration. All these contribute to reduced work capacity and overall performance in adults, bringing serious economic consequences and obstacles to national development. World Bank estimated that Iron deficiency anemia causes almost a million deaths per year, while the loss is immeasurable, in economic terms these annual deaths simply represent worldwide loss of $50 billion in gross domestic product (GDP) as cost lost annually. And the Net present value of lost future work force, valued at about 4.05% of gross domestic product –US $3.32 per capita in lost productivity and US$14.46. per capita in lost cognitive function as IDA reduces IQ by half a standard deviation [18]. In 2016, World Bank estimate that India loses 0.9 percent of GDP, amounting to a loss of up to $ 20.25 billion (RS.1.35 lack crore) [17]. Therefore anemia is a challenge for both the globe and the nation's economic well-being.

Intervention strategies

The major causes of anemia can be addressed during contacts with vulnerable groups using combination of following key interventions, as needed [18]:

- Prevention and treatment of anemia

- iron fortification of staple foods

- Iron supplements to high risk groups

- Use of insecticide to treated materials and bed nets,

- Regular deworming in high risk groups

- Increase production of food rich in iron

- Promoting consumption of foods with iron

- promoting consumption of all micronutrients like folic acid, vitamins A, C, B-12 and zinc

- Timely immunization of children

- Prevention and treatment of communicable diseases

- Managing obstetric complications, particularly excessive bleeding

- Encouraging birth spacing through use of modern contraceptives and exclusive breastfeeding

- Improve water and sanitation facilities/practices

- Increasing public awareness and knowledge, educating public about health risk associated with anemia.

- Emphasing exclusive breast feeding from with-in one hour of birth to at least six month of age.

Where to combat anemia

As the women of child bearing age particularly when pregnant, and children < 5 years are the most anemic, particular attention should be focused on them. Public health facilities should be optimized to reach young children and their mothers and adolescent girls as they constitute the most vulnerable group. Private and public schools should be involved for both preventive and essential strategies and implementation of action plan to reach children and adolescents. Parents and the teachers should be a work directly with communities in the domains of sanitation, environmental health, hygiene and infectious disease control programs. Agriculture extension and food security programs should be encouraged to increase production and consumption of foods rich in iron and other micronutrients [18]. As anemia is high even in the affluent groups, intervention programs should be wide spread among all socio economic groups.

Conclusion

The government is making continuous efforts to check anemia and many nutritional intervention programmes and policies have been launched to curb the prevalence of anemia like National Anemia Prophylaxis Programmes (1972), Integrated Child Development Services scheme in 1975 and the recently launched National Rural Health Mission (2005) [19]. The main purpose was promotion of iron rich food, provision of iron and folate supplements to high risk groups (all pregnant and lactating women, Intra Uterine Device users), identification and treatment to severely anemic people and to educate mothers on health and nutrition to prevent maternal anemia, but the evaluation of large scale programmes shows that maternal anemia has not declined significantly [20]. In some settings, considerable reductions in the prevalence of anemia have been achieved; but the research shows wide gaps and loopholes leading to insufficient overall progress. Despite the huge multiplying adolescents' population, the health need of adolescents have neither been reached nor meaningfully addressed. Moreover their reproductive health needs were often misunderstood, unrecognized and underestimated. Policies and programmes focused little on the health of adolescents as they are basically considered a healthy group having the lower mortality and morbidity compared with other age groups. Action is needed to improve nutritional status before pregnancy- a policy that is feasible given the current interest in adolescent sexual and reproductive health.

In order to effectively combat it, the contributing factors must be identified and addressed. The identified settings where prevalence of iron deficiency is the most frequent, additional iron intake should be provided through iron supplements to vulnerable groups; but in the absence of comprehensive and user friendly services, adolescent health remain void.

There is some work underway in this regard, but it has not yet achieved much traction in low- and middle-income countries. The UN agencies [17], notably UNICEF, UNFPA and World Health Organization (WHO) has focus attention on adolescent as a critical global gap and an "age of opportunity" much more needs to be done by health care professionals and practitioners globally to address the gap between broad policies and local action. Extremely focused and dedicated actions are required to reach the World Health organization target of a 50% reduction of anemia in women of reproductive age by 2025 [4]. This is the real global challenge for which all the stake holders should stand in unison.

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