

Evidence based Intervention to Prevent Anemia Among Women of Reproductive Age Group in Developing Countries; Review

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Abstract— Introduction: Anemia in developing countries is biggest public health problem. The most vulnerable group of population is women and children. Problem Statement: The woman in developing countries has high prevalence of anemia due to high rate to fertility. There are various interventions are working in different countries but don't know which intervention are most cost effective. Objective: The objective of this study is to determine the cost-effective intervention for reduction of anemia among women of reproductive age group. Methodology: A review of the literature was done for identifying various preventive strategies regarding anemia among women of reproductive age group and its implementation barriers in low- and middle-income countries. Google scholar, PubMed, web of science and Scopus were used as search engines. Results: The result of the review shows that most cost-effective method for prevention of anemia among women are iron fortification of food, iron supplementation, community-based health promotion of healthy nutrition. Women empowerment is the best tool for implementation of all above method for prevention of anemia. The most effective way to reducing the maternal anemia is community-based intervention for health promotion and women empowerment. Conclusion: Community based intervention in which all stakeholders on board are the best strategy to reduce the anemia among women of reproductive age group. There is need to develop the policies to improve the health promotion activities and involvement of women in the society.

Keywords— Anemia; Cost-effective; Evidence; Women

I. INTRODUCTION

IN developing countries, anemia is a biggest public health problem. It is defined as when red-cell count, the deficiency in

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meeting the oxygen demands of tissues has reduced in the human body [1]. Anemia affects quarter of the global population [2]. The burden of anemia is estimated at 9% in high income countries, the burden is higher in developing countries i.e., the prevalence is 43% [2]. Reproductive age group women and children were the most vulnerable population. The average prevalence of anemia in worldwide is estimated from 47% in children younger than 5 years, 42% in pregnant women, and 30% in non-pregnant women aged 15–49 years [2]. In Africa and Asia more than 85% of the anemia prevalence was found among vulnerable population such as women and children. Therefore, the problem is worse in low- and middle-income countries. Approximately 3.1% of the disease burden occurring in developing countries is due to iron deficiency anemia [3]. A pregnant woman is anemic if the hemoglobin level is less than 11 mg/dl [4]. Approximately fifty percent of reproductive age group women were anemic in Eastern Mediterranean and African region [3]. In Pakistan approximately 51% of pregnant women are anemic [5].

Anemia has wide range of complex determinants ranging from political, ecological, social and biological factors (Figure 1) [6]. Their interplay also makes it difficult to identify important factors because all the above-mentioned factors relate with each other. The factors like education, wealth status, empowerment, employment also describe the probability of women to be having low hemoglobin levels [7]. Most of the time, anemia and low socioeconomic status are implicitly found together; with individuals having low education and being in poorest quintile would be more prone to have anemia and its associated risk factors. The figure 1 explains the broad determinants of anemia and the interplay of various levels of factors. These hierarchical determinants play an important role in the individual make up of an individual, its vulnerability status which ultimately have an influence on the nutrition status. Literature has shown that low paternal schooling, caesarean births, consumption of untreated water are important determinants of anemia [8]. Nationally representative survey from India also highlighted that anemia is related with poverty, illiteracy, low cast and tribes [9]. Some literature also suggested that socio-cultural factors like literacy, lower socioeconomic status, living in joint family and number of antenatal visits less than three are important predictors of anemia in pregnant women [10]. Dietary factors like Khat Chewing

and Pica (soil eating) are also found to be important precursor of anaemia in pregnant women. A study from urban community from Hyderabad, Pakistan reported that consumption of clay during pregnancy, drinking three or more cups of tea per day during pregnancy period, and egg and red meat consumption less in a week during pregnancy were associated with anaemia [11]. Besides poor nutrition, frequent labour, multiparty, abortions, parasitic infestations are strong associated with anaemia in reproductive age group of women [12].

Pregnancies in lower age group i.e., age below 20 years are common in developing countries. Its relationship with anaemia has been an established fact. Developing countries have higher proportion of frequent pregnancies as compare to developed countries. This poses additional nutritional demand on women of developing countries which in turn affects their general wellbeing and let them very little time to recover from consecutive pregnancies in short duration [13].

Anaemia has adverse medical and socio-demographic and financial effects in the society. Slight to moderate anaemia predispose the women of having severe anaemia, in addition also affects the general health, well-being, early fatigue and decrease in ability to do routine work. Severe anaemia that occurs in low and middle income is a main cause of maternal mortality rate [14]. Anaemia caused circulatory system of human body which may cause myocardial infarct and death, whereas it's also causes various infection and bleeding problem [14]. During pregnancy it caused premature delivery, intrauterine growth retardation, low birth weight and increase in perinatal mortality. [15]. Baby born from anaemia women are more likely chance of infant mortality due to reduced iron and hemoglobin. [15]. Safe motherhood strategy developed by World health organization in which major objective is to reduce the anaemia during pregnancy.

Different intervention for reduction of anemia such as enhancement of dietary intake, food fortification and food diversification, supplementation of micronutrient specifically iron, common disease control, and health education [16]. Recently, United State for International Development (USAID) flagship program i.e., (MCHIP) maternal and child health integrated program have started and major component is integration of these evidence-based interventions for anemia prevention and control [17]. There were different studies results found that iron and folic supplementation (IFA) in pregnancy improved the hemoglobin level in the body which reduced the prevalence of anemia. Integration of all interventions such as antiworm and anti-malarial given during pregnancy are more effective for reduction of anemia prevalence among women compare to single intervention. The integrated interventions package that has been implemented in field by MCHIP included supplementation of daily iron folic acid, fortification of food with iron in primary health centers, health promotion like malaria prevention using insecticide treated nets and combination therapy (Artemisinin) [17]. Deworming and birth spacing of at least 2 years is also part of the package that has been implemented in the field [17]. The objective of this review is to identify key evidence based and

cost-effective interventions that in developing countries to combat anemia and that has resulted in reduction of complications associated with adverse events associated with maternal anemia.

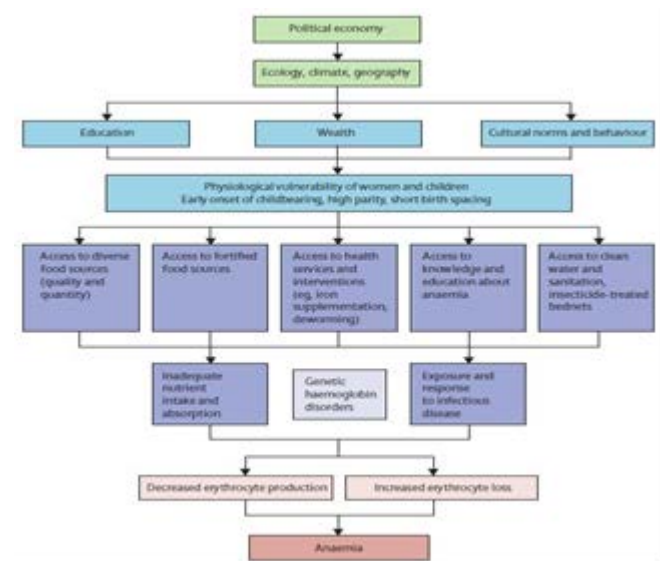


Figure 1: Conceptual model of the determinants of anaemia (adapted from reference 7)

II. METHODOLOGY

A review of the literature was done for identifying various preventive strategies regarding anaemia and its implementation barriers in developing countries. Google scholar, PubMed, Scopus and Web of science were used as search engines. Search terms used were 'maternal anaemia, maternal anaemia, preventive strategies for maternal anaemia, preventive strategies regarding anaemia for low and middle-income countries, preventive strategies regarding anaemia for developing countries, preventive strategies regarding anemia for high income countries. References of the relevant articles were also used for citations.



Figure 2: Selection criteria for articles

III. RESULT AND DISCUSSION

The important interventions for preventing maternal anemia based on an analysis of the available evidence.

III.A. IRON FORTIFICATION OF FOOD IN WOMEN REPRODUCTIVE AGE

First article included was a cost-effective analysis of iron supplementation and iron fortification interventions in four regions of the world [African sub region (AfrD), the South American (AmrB), the European sub region (EUR A), and the Southeast Asian sub region (SearD)] [18]. This paper included articles following WHO guidelines for iron supplementation as daily 60 mg supplement iron given to pregnant women visiting antenatal clinic for 6 months during pregnancy, and for 3 months postpartum. Fortification of food with iron and folic acid is easy to give women for reducing anemia. In developing countries, cereal flour is the staple food. The study team collected primary data as well as review of the literature was also done. It was concluded that on majority of community (95%) used iron supplementation compare to iron fortification and its impact as improve the hemoglobin concentration of women in reproductive age groups. Result of iron supplementation found that approximately 12500 disability adjusted life years (DALYS) has been reduced in the European community. In African region It is estimated that 2.5 million DALYS annually and increase maternal and child mortality. But fortification of food is less cost compare to iron supplementation and most effective economically. However, it is awareness health workers and community workers to promote the benefit of fortification of food with iron which save the extra cost for this intervention [18].

One of the studies reviewed efficacy of iron fortified flour to investigate the minimum daily amounts of iron consumed which improve the health status of women in reproductive age group [19]. This study concluded that only few countries in South America, GULF and central Asian were expected to increased iron level among women of reproductive age group [19]. Many countries were used substandard, low-bioavailability, hydrogen-reduced iron powders [19]. Another study in which meta-analysis of 60 trials found that 41% reduction risk of anemia among women of reproduction age group (RR 0.59, 95% CI 0.48–0.71, $p < 0.001$) and a 52% reduction in maternal mortality (0.48, 0.38–0.62, $p < 0.001$) [20].

In countries, like Pakistan, mass fortification of food with iron and folic acid can be one of the important interventions to reduce the complications associated with maternal anemia. Micronutrient associated with anemia but if used with food it is safe and cost effective strategy for prevention of anemia. As an agricultural country, the people living in the rural population may have limited access to processed food that will result in limited utilization. However, it is recommended that apart from all these limitations, food should be fortified at the population level, and it will give the eventual benefit. Legislation is also required, so that food can be fortified with adequate levels.

III.B. IRON AND FOLIC ACID SUPPLEMENTATION DURING REPRODUCTIVE AGE GROUP WOMEN

Iron and folic acid supplementation has been important intervention for reducing the anemia among women of reproductive age and pregnant women. A several systematic review and randomized controlled trials and quasi-

experimental studies found that giving iron supplementation during reproductive age group, significant reeducation of anemia (RR 0.73, 95% CI 0.56–0.95), hemoglobin in blood (MD 4.58 g/L, 95% CI 2.56–6.59) and ferritin concentration in blood (MD 8.32, 95% CI 4.97–11.66) [21]. Few other reviews regarding effectiveness of micro-nutrient interventions also confirmed that these interventions are cost effective [22],[23]. On the other side, evidence from developing countries also found that iron supplementation on large scale usually not effective [24]. Noncompliance of women is one of the important reasons for not having significant results [24].

In Pakistan, decrease accessibility of animal protein in faraway areas of countries and preference of good nutrition of food to boys and husband as major factors for anemia in women which lead to high mortality of women. Opposing to the belief that women stop taking iron tablets due to culture restraints, side effects and religious beliefs of infertility, but it facts that only few women have side effects of iron supplementation. Hence iron and folic acid supplementation and advocacy is recommended as a vital component of antenatal care in order to have a spillover effect on reducing complications and preventing maternal anemia. Training of health service providers should therefore emphasize on knowledge and understanding of the importance of iron supplementation for reduction of prevalence of anemia among women of reproductive age group.

III.C. HEALTH PROMOTION FOR NUTRITION EDUCATION IN COMMUNITY INVOLVEMENT

Health promotion with community- involvement to reduce the prevalence maternal anemia is important steps to deliver key interventions. The 2008 Copenhagen Consensus has also prioritized community-based nutrition promotion as one of the key interventions among the top ten global issues [25]. Cost benefit approach was adopted by the panel in the meeting to compare different topics after accounting for limitations of the method [25].

Health promotion strategies are the basic and practical among developing countries like Pakistan. Several studies suggest that that fifty percent of complication has been reduced during pregnancy by health education and promotion of nutrition with community involvement and it improve the local health system.

III.D. INTEGRATED ANEMIA CONTROL STRATEGY

Integrated anemia control strategy can be used as an important strategy to combat anemia among women of reproductive age. In South America, country Nicaragua, study shows that integrated anemia control strategy (IACS) has significantly improved hemoglobin level in women and children [26]. This strategy developed by ministry of health of country and implemented 15 years back. They provide the iron and folic acid supplementation for pregnant women; fortification with iron of flour; anti worm medication to children; vitamin A supplementation; behavioral change communications (BCC); comprehensive training of health service personnel, community health volunteers (CHVs) and non-governmental organizations (NGOs); and a program monitoring and evaluation (M&E) system [26]. A

comprehensive plan was executed and from baseline survey to follow up at the end of the project, it was monitored and supervised by various stakeholders that were part of the project [26].

Similarly, iron intensification project (IIP) in Nepal has also given promising results and has resulted in pregnant women giving iron supplementation for reduction of prevalence of anemia and improve the antenatal care which effect to reduce the maternal mortality [27]. These interventions in the community were delivered by female community health volunteers (FCHVs) which were major corner stone of this project. The FCHVs delivered a package of services, not just iron & folic acid supplementation. The national prevalence of maternal anemia substantially decreased from 68% in 1998 to 36% in 2006 in women of reproductive age [27].

In Pakistan, efforts can be done to integrate the prevention strategies done for anemia control. Collective efforts will give positive results, lady health workers coverage can be utilized for effective anemia control. There were efforts related to micronutrient initiative, but it was in bits and pieces. Other, non-government organization can also be taken on board for making effective strategy and implementation for anemia control.

Maternal anemia is still a widespread problem in low- and middle-income countries. There are different interventions were brief, but the major intervention is population level fortification of food with iron and folic acid. Community based intervention for health promotion of good nutrient was the good strategy in reducing the anemia among reproductive age group women. Along with this, iron supplementation, community-based interventions for nutrition education and promotion and integrated anemia control strategy were also effective in reducing maternal anemia. Health system and health care proved is the key stakeholder for reducing the anemia during pregnancy it should be improved to prevent the complication associated with maternal anemia

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