

A new family home approach to controlling iron deficiency anemia in all ages in less-developed and developing countries using iron-fortified water

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SUMMARY: Nutritional iron deficiency anemia is considered the main public health problem of poor less-developed and developing countries. The World Health Organization has estimated that 1.5–2.0 billion persons are anemic. It has been said that close to 1 million deaths are linked to iron deficiency anemia. The groups most vulnerable to this form of anemia are said to be small children and women of reproductive age. Our goal is to show that iron fortification in the water, will control anemia. The method used was a literature review. Methods have been identified to control anemia, but the fortification of water is a more efficient, low cost, reaches the entire population, prevents and treats deficiency anemia.

We concluded that the iron fortification of drinking water at home is a simple, effective, and low-priced approach for the prevention of iron deficiency anemia prevalent in poor and developing countries.

Key words: New method, drinking water, iron deficiency anemia, anemia prevention.

RESUMO. Um novo método para controlar em casa a anemia ferropriva de todas as idades nos países pobres e em desenvolvimento usando água fortificada com ferro. A anemia por deficiência nutricional de ferro é considerada o principal problema de saúde pública dos países menos-desenvolvidos e em desenvolvimento. A Organização Mundial de Saúde estimou que 1,5-2,0 milhões de pessoas são anêmicas. Aproximadamente 1 milhão de mortes estão ligadas a anemia por deficiência de ferro. Os grupos mais vulneráveis a anemia são crianças e mulheres em idade reprodutiva. Nosso objetivo é mostrar que fortificação de ferro na água, irá controlar anemia. O método utilizado foi revisão da literatura. Diversos métodos têm sido identificados para controle da anemia, mas a fortificação da água é uma forma mais eficiente e de baixo custo, atingindo toda a população, prevenindo e tratando a anemia por deficiência. Concluímos que a fortificação de ferro na água potável em casa é uma abordagem simples, eficaz e de baixo custo para a prevenção da anemia ferropriva prevalente nos países pobres e em desenvolvimento.

Palavras-chaves: Água potável, deficiência de ferro anemia, prevenção de anemia, novo método.

INTRODUCCIÓN

Several publications have shown the importance of iron in human health (1,2). Iron deficiency anemia is the most prevalent nutritional deficiency around the world (3,4).

Among the millions of persons vulnerable to iron deficiency anemia, the most prevalent are small children, children, young pregnant adolescent girls, and mothers of reproductive age in the less-developed and developing world (5-8). The World Health Organization (WHO) has estimated

that 42% of pregnant women, 30% of non-pregnant women, 47% of preschool children, and 12% of men are anemic (1,5,6). Data from WHO state that 800,000 deaths can be attributed to iron deficiency each year (1,5).

The main cause of iron deficiency and iron deficiency anemia are considered to be a vegetable diet low in iron, together with poor iron availability and the presence of iron inhibitors (9,10). It is known that a growing number of persons with anemia are present in various parts of poor and developing. A large number of scientific papers show that small children and women anemia are prevalent all over the world (1,5). From the public health point of view, anemia is a family problem that can affect all ages. Recent papers from the north-eastern part of Brazil have indicated that iron deficiency anemia is a highly prevalent problem for family members of all ages among less-developed urban and rural workers. Children of less than 5 years (67.6%), children from 5 to 11 years (44%), 60.0% of pregnant women, and women over 15 years (38.8%), as well as 20.3% of men were found to be anemic (11-13).

Our objective is to show that iron fortification in the water, will control anemia.

Iron supplementation to control iron deficiency anemia

Iron medicine, pills, tablets, syrup, drug are the most usual and scientific method for the control and treatment of iron deficiency anemia on several ages groups (children, mother, senior and woman)and anemia has not been controlled, they do not reach all ages groups at the same time.

Problems with the availability, distribution, price and daily intake of iron drugs have been shown present medicines supplementation a difficult strategy to reach implement with all ages of anemic population in less-developed countries (14,15).

Multiple micronutrients (MMN) and children iron deficiency anemia

The strategy of using multiple micronutrients (MMN) to control iron deficiency anemia in

children was developed in Canada. The regimen uses an aqueous mineral and vitamin formula to be spread over the meals of children. It has been strongly supported by international organizations, such as WHO and UNICEF (16-18). Sachets of MMN including iron (15–45 mg) are spread daily on meals of anemic children controlling their anemia. This strategy has had great success and publicity (19). It has been highly recommended, not only for the control of iron deficiency anemia, but also deficiency in other minerals and vitamins (19,21).

Food Fortification

Food fortification is considered the most cost-effective method for providing additional iron in advanced industrialized countries. The situation is not the same in less-developed or developing countries. There is not the solution at the poor countries. The essential requirements for implementing fortification strategies include carries that are available and consumed daily by all age population as our proposed drinking water (22, 23). In the United States and other developed countries in Europe, food fortification has been considered an important means of anemia control (2,24,25). However, in the least developed countries or even the underprivileged areas of the developing world, it would be quite difficult or impossible to control iron deficiency anemia through the commercial distribution and consumption of iron-fortified foods. A recent Brazilian publication found that bread made with iron-enriched wheat flour did not improve the anemia status of small children (26). Another way of supplying extra iron is to explain to the population how to prepare meals using iron pots (27).

Iron fortification of drinking water

Studies on the iron fortification of drinking water for the control of iron deficiency anemia started a long time ago in Brazil. Water is consumed daily, everywhere by all ages' children,

adults and old members of each family. Iron fortified drinking water reduced the number of anemics children and adults carried out at experimental field studies in several places of our country (28,29). Daycare centers that look after preschool children with a high prevalence of nutritional iron deficiency anemia were used to demonstrate the effect of iron-fortified drinking water. Several references on the positive effect of drinking water fortified with iron on the reduction of iron deficiency anemia have been published by our group, as well as by other research groups in Brazil (30-34). Our last published paper on the use of iron-fortified water to reduce iron deficiency anemia concerned a randomized blind clinical study, confirming that drinking iron-fortified water will reduce iron deficiency and iron deficiency anemia in children (35).

Because of our success showing that drinking iron-fortified water at daycare children would control iron deficiency anemia we are proposing to implement the home iron fortification of drinking water as a new way to home supply iron to all ages low socio economic family members populations that consume a poor low iron vegetable diet and drink local water daily to control all ages iron deficiency anemia (29,32). Their available local water is easily fortified at home when we provide highly soluble iron salts. Ferrous sulfate is known to be the best water-soluble and cheaper iron salt available. Some color and iron taste may be developed and can be reduced by the addition of ascorbic acid. Adults drink and adapted to water with different flavors around the world. Encapsulated and other bioavailable iron salts may also be used for the fortification of water and there is no taste. Iron and other nutrients may be added to water to address specific human mineral and vitamin deficiencies around the world (33). The natural presence of drinking water iron in parts of Bangladesh was shown to be responsible for the low rates of iron deficiency anemia in parts of the country (35, 36). Encapsulated iron

dispersible in water is also available and could be used as iron fortification, avoiding rejection due to water tasting of iron (37). Water can also be fortified with other iron salts as NaFeEDTA, a highly bioavailable iron, which has no taste and color, but is more expensive (38).

Home iron fortification of water can supply iron to both urban and rural areas of a country. It is also of importance that iron-fortified drinking water can be used for cooking family meals, another way of supplying the daily iron intake and preventing all age iron deficiency anemia (29). The fact is that fortification of drinking water with iron is easily implemented at home. Iron sulfate is quite inexpensive and different amounts of iron will supply the recommended iron daily intake for each family member (29).

Comments on home iron fortification of drinking water

Iron is an essential nutrient and iron deficiency is present when iron is not available in the quantity and at the quality needed for metabolic function. Anemia has been shown by a large number of studies to become one of the main health problems in the less developed and developing world. It affects not only health, but also the quality of life and work capacity of million persons around the world. Nutritional iron deficiency and iron deficiency anemia are the result of low iron intake and poor availability of iron in vegetable diets, as well as iron absorption inhibitors in several parts of the world, particularly the least developed and developing countries.

A great number of scientific studies on iron supplementation and fortification have been undertaken in relation to the control of iron deficiency and iron deficiency anemia. They have been carried out to control the anemia worldwide, particularly that prevalent in less developed countries and the poor areas of developing countries. It has been shown that iron supplements could supply the iron requirement of children and

women of reproductive age through iron solutions or tablets. These iron supplements should be used for a few months. When they are stopped and the children and women revert to eating the same vegetable diet poor in iron, there is the possibility of iron deficiency anemia returning.

Drinking water, which is consumed daily by all ages persons everyone all over the world, is a simple, practical home way to supply iron for the control and for the local prevention of iron deficiency anemia.

Our proposal is the use of home iron-fortified drinking water to control iron deficiency anemia in family members of all ages, where there is not treated water. The iron fortification of drinking water is easily prepared at home from a pharmaceutical concentrated iron solution obtained from Health Centers and Commercial Centers. Mothers can be easily shown how to dilute the public health and/or commercial concentrated solution to prepare the recommended amount of iron per liter of water. The home dilute iron solution can also be used for the daily preparation of food at home. It is another source of bioavailable iron for children and adults at poor urban and rural areas and the possibility of toxicity is low.

Final Remarks

The high and even growing prevalence of iron deficiency anemia in the less developed countries of the world and the large number of studies carried out on this subject shows that iron deficiency anemia has not been controlled. It is even said that iron deficiency anemia is growing in several less developed and developing countries and new ways must be sought to control the problem. Several iron supplementation and iron fortification programs cannot be used to control iron deficiency in poor areas. It has not shown that iron deficiency anemia could be controlled in all age groups of children and adults at the same time through the use of iron supplements or iron fortification.

The control of nutritional iron deficiency anemia will only be achieved when sources of bioavailable iron is continuously offered and are consumed daily by all age members of the low level and poor population. We propose here that each children, youngsters, adults and seniors of both sexes should consume iron-fortified drinking water daily, supplying their iron needs and preventing iron deficiency anemia. The iron fortification of drinking water at home is a simple, effective, and low-priced approach for the prevention of iron deficiency anemia.

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