ISSN: 0975-833X

Available online at http://www.journalcra.com

International Journal of Current Research
Vol. 8, Issue, 12, pp.43519-43521, December, 2016

INTERNATIONAL JOURNAL OF CURRENT RESEARCH

RESEARCH ARTICLE

ROLE OF MICRONUTRIENTS IN PROMOTING THE HEALTH OF CHILDREN-A REVIEW PAPER

***Sandhvi Swiny and Kumari Pooja**

College of Home Science, Dr. R.P.C.A.U., Pusa, Samastipur-848125, Bihar, India

ARTICLE INFO

Article History:
Received 23rd September, 2016
Received in revised form
20th October, 2016
Accepted 29th November, 2016
Published online 30th December, 2016

Key words:

Micronutrients deficiency,
Children,
Health,
Nutrition.

ABSTRACT

The health and well being of children depend upon the interaction between their genetic potential and exogenous factors like adequacy of nutrition, safety of the environment, social interaction and stimulation. Micronutrients are that nutrients needed by the body in minute amounts, play leading roles in the production of enzymes, hormones and other substances and help to regulate growth activity, development and functioning of the immune and reproductive systems. Deficiencies of micronutrients are a major global health problem. The World Health Organization (WHO) considers that more than 2 billion people worldwide suffer from vitamin and mineral deficiencies, primarily iodine, iron, vitamin A and zinc, with important health consequences. The groups most vulnerable to micronutrient deficiencies are pregnant women, lactating women and young children, mainly because they have a relatively greater need for vitamins and minerals and are more susceptible to the harmful consequences of deficiencies. For a young child, micronutrient deficiencies increase the risk of dying due to infectious disease and contribute to impaired physical and mental development. Its' deficiencies increase the general risk of infectious illness and of dying from diarrhoea, measles, malaria and pneumonia. These are silent epidemics that affecting people of all genders and ages, as well as certain risk groups. They not only cause specific diseases, but they act as exacerbating factors in infectious and chronic diseases, greatly impacting morbidity, mortality, and quality of life. Micronutrient deficiency conditions relate to many chronic diseases, such as osteoporosis osteomalacia, thyroid deficiency colorectal cancer and cardiovascular diseases.

Citation: Sandhvi Swiny and Kumari Pooja, 2016. "Role of Micronutrients in promoting the health of children-A Review Paper", *International Journal of Current Research*, 8, (12), 43519-43521.

INTRODUCTION

The health and well being of children depend not only on the macronutrient but also on the consumption of micronutrient. According to Caballero (2004), almost two-thirds of the deaths of children around the world are directly or indirectly associated with nutritional deficiencies. Both proteins-energy malnutrition and micronutrient deficiencies increase the risk of death from common diseases such as acute gastroenterities, pneumonia and measles. Iron deficiency anemia, for example, is estimated to affect almost 25% of the world's population resulting in high economic cost by adding to the burden on health care services, affecting learning in school and reducing adult productivity (Caballero, 2004). Nutritional deprivation is a serious international problem that can lead to long-term deficits in growth, immune function, cognitive and motor development, behavior, and academic performance. In Bihar, the percentage of underweight children went up from 54.3 per cent to 58.4 per cent between the period 1999 and 2005. It is estimated that 8.33 per cent or 9,74,610 children in Bihar are severely and acutely malnourished and are at the highest risk of dying. Although in the past most of the attention has been directed toward the negative consequences associated with inadequate protein-energy intake, there is increasing recognition of the important role that micronutrient deficiency plays in children's cognitive and motor development. Micronutrients, more commonly known as vitamins and minerals, are present in small quantities in food and are an essential component of a healthy diet. They include trace elements, such as iron, iodine and zinc, among others, and minerals such as calcium and magnesium, as well as the full range of vitamins. UNICEF (1998) defined micronutrients as nutrients that are only needed by the body in minute amounts, which play leading roles in the production of enzymes, hormones and other substances, helping to regulate growth activity, development and the functioning of the immune and reproductive systems. Micronutrients of known public health importance include the following: zinc, iodine, iron, selenium, copper, vitamins A, E, C, D, B2, B6 and folate. Deficiencies occur when people do not have access to micronutrient-rich foods such as fruit, vegetables, animal products and fortified foods, usually because they are too expensive to buy or are locally unavailable. Their availability in the right quantities and the correct combinations can make the difference between a

****Corresponding author: Sandhvi Swiny***
College of Home Science, Dr. R.P.C.A.U., Pusa, Samastipur-848125, Bihar, India.

healthy existence and one that is plagued by poor health. Indeed, a lack of micronutrients results in micronutrient deficiency, and its severe consequences can ultimately lead to death. Micronutrients play significant roles in the health of children. This paper therefore reviews the roles of the various micronutrients in children.

Vitamin A

Vitamin A deficiency is a public health problem all around the world, affecting more than 100 countries. Vitamin A deficiency is common in developing countries. Approximately 250, 000 to 500,000 malnourished children in the developing world go blind each year from a deficiency of vitamin A (Institute of Medicine, Food and Nutrition Board, 2001). In countries where such deficiency is common and immunization programme are limited, millions of children die each year from complications of infectious diseases such as measles, diarrhoea, pneumonia and malaria (Ross, 1992). Vitamin A has a vital role in maintaining eye health and vision, growth, immune function and survival (Sommer and West 1996). Vitamin A deficiency is the most important cause of preventable blindness in young children (Vijayaraghavan 2006). Incidence of morbidities, especially episodes of respiratory infection, diarrhoea, measles and childhood mortality are closely associated with VAD. The solution for correcting vitamin A deficiency lies in improving the child's diet through increased consumption of vitamin A-rich foods, naturally rich or commercially fortified foods such as processed oils or sugar. In countries where this remains a public health problem, and while food-based solutions are gradually being implemented and scaled-up to reach those populations, giving children two doses of vitamin A per year – when children are between the ages of 6 months and 5 years of age – reduces their chance of dying by up to 24 per cent and reduces child blindness by up to 70 per cent. The National Health and Nutrition Examination Survey (NHANES), (2000) indicated that major dietary contributions of retinol are milk, margarine, eggs, beef liver and fortified ready-to-eat cereals, whereas major contributors of pro-vitamin A carotenoids are carrot, sweet potatoes and spinach (Harrison, 2005). Animal sources of vitamin A are well absorbed and used efficiently by the body. Plant sources of vitamin A are not as well absorbed as animal sources. Vitamin A deficiency can be prevented by food fortification and by eating foods that are rich in vitamin A and also by supplementation.

Iron

Iron is an important micronutrient that ensures the development of normal red blood cells and healthy immune function. Anaemia reduces the energy levels and capacity of people to fully function in their communities and lives. Iron deficiency anaemia is the most widely prevalent nutritional problem across the world (Carlos Alberto *et al.,* 2005) affecting almost all age/sex/physiological groups; pre-school children, pregnant women and lactating mothers being the most vulnerable (Agarwal 2001). About 60–70% of all children below 6 years of age suffer from various degrees of anaemia (Kapur *et al.,* 2002), significantly contributing to childhood morbidity and mortality. Infants and young children are the most adversely affected by iron deficiency because they are growing and developing at such a fast rate (Draper, 1996). If iron deficiency is not corrected, it leads to anaemia, which is the most common nutritional disorder in the world. The World Health Organization (WHO) estimated that 51% of children under 4 years old in developing countries are anaemic as a result of iron deficiency. Draper (1996) also observed that iron deficiency anaemia is associated with impaired development of mental and physical coordination skills and impaired school achievement in older children. It lowers resistance to disease and weakens a child's learning ability and physical stamina. It also slows mental and motor development and reduces work performance (UNICEF, 1998). Iron deficiency anaemia can be prevented in children by food fortification such as the addition of iron to food over and above that naturally found in food. Naturally iron-containing foods should not be neglected. Mothers should be encouraged to feed their infants and young children meat and foods rich in vitamin C, such as fruits, and to avoid foods and drinks that inhibit iron absorption, such as tea, during and 2 hours before and after mealtime. Traditional food practices such as germination and/or fermentation can also improve the availability of iron in the diet.

Zinc

Zinc deficiency is a serious health problem, affecting approximately 30 per cent of the world's population. People living in low to middle income countries are at particular risk because of limited access to zinc-rich foods, although excess losses of zinc during diarrhoea is also a factor. Zinc deficiency is ranked as a leading risk factor in causing diseases, especially diarrhoea and pneumonia in children. Zinc, combined with oral rehydration salts (ORS), is helping children recover from diarrhoea faster, resist the disease for longer periods and have fewer episodes per year. Zinc plays an important role in the promotion of normal growth and development and is an element in the enzymes that work with red blood cells, which move CO2 from tissues to lungs. It also helps to maintain an effective immune system. Zinc deficiency in malnourished children contributes to growth failure and susceptibility to infections. It is also associated with complications of child birth. This deficiency usually occurs where malnutrition is prevalent (UNICEF, 1998). Zinc is found in a wide range of foods; the richest sources are animal protein (meat, eggs and dairy products) shellfish, pulses, nuts and whole meal grains. White flour is a poor source of zinc because the zinc is mainly found in the outer layers of the grain and because the fibre in grain contains phytates, which inhibits the absorption of minerals.

Iodine

Iodine deficiency is most damaging during fetal development and in the first few years of a child's life. It is estimated that 38 million babies are born without the protection that iodine offers the growing brain, and a full 18 million are mentally impaired as a result. Iodine Deficiency Disorders, a group of disorders resulting mostly from an insufficient dietary supply of iodine (Gomez and Alvarez 1997), is also a major public health problem in some parts of India (Kapil 2000). Iodine deficiency leads to a number of disorders including increased incidence of abortion, still birth, congenital malformation, cretinism, mental retardation and hypothyroidism. At least 30% of households around the world still consume salt that either isn't iodized or isn't adequately iodized. We need to get iodine into the diets of more young women and their babies in order to prevent this brain damage, and help ensure all children can reach their full development potential. Iodine deficiency is the single most important cause of preventable brain damage and mental retardation including low IQ (intelligent quotient) (UNICEF,

1998) and severe iodine deficiency can lead to cretinism and birth defects as well as miscarriage and stillbirth. In many middle to high income countries, the problem of iodine deficiency has largely been solved by adding iodine to salt, known as salt iodization, which then makes it into animal feed, breads, processed foods and salt shakers in homes around the world. Salt iodization is one of the most successful public health campaigns in the world.

Calcium

Calcium is an essential nutrient that plays a vital role for the human body, including blood clotting, and building bones and keeping them healthy. Pregnancy places tremendous demands on a women's body and complications during this time can be serious and sometimes fatal. One of the leading causes of maternal deaths are the hypertensive disorders pre-eclampsia and eclampsia. Currently, there is only one nutritional strategy recommended by the World Health Organization (WHO) for prevention of pre-eclampsia: calcium supplementation.

Conclusion

All efforts should be made that children take a well balanced nutritious food by encouraging them to consume green leafy vegetables, soy beans, seasonal fruits, milk and dairy products, fish, eggs, chicken and other food stuff. However, the prevailing dogma in nutritional science that a balanced diet is sufficient to meet all the nutritional requirements has been challenged (Singh, 2004). According to the recommendations of United Nations Sub-committee on Nutrition, it is not possible to meet the requirements of 100 percent recommended dietary allowance (RDA) of micronutrients from dietary sources alone (Allen, 2001). Nutritional supplements are thus mandatory to improve physical growth and mental development and prevent occurrence of common day-today infections. Healthy children do provide a solid foundation to the society in order to ensure optimal resource development of a country.

REFERENCES

Agarwal, K.N. 2001. Iron and the brain: Neurotransmitter receptors and magnetic resonance spectroscopy. *Brit J Nutr.,* 85(Suppl 2): 147–150.

Allen, L.H. 2001. Micronutrients. 2020 Focus 5 Health and Nutrition Emerging and Reemerging Issues in Developing Countries. Brief 10 of the International Food Policy Research Institute.

Arlappa, N., A. Laxmaiah, N. Balakrishna, R. Harikumar, Mallikharjuna Rao Kodavanti, Ch Gal Reddy, S. Saradkumar, M. Ravindranath and G. N. V. Brahmam, 2011. Micronutrient deficiency disorders among the rural children of West Bengal, India. *Annals of Human Biology*, 38(3): 281–289

Draper, A. 1996. Child Development and Iron Deficiency. The Oxford Brief.

Gerster, H. 1997. Vitamin A-functions, dietary requirements and safety in humans. *Int. J. Vitam Nutr. Res.,* 67: 71-90. (Pub Med Abstract).

Harrison, E.H. 2005. Mechanisms of digestion and absorption of dietary vitamin A. *Annu. Rev. Nutr*., 25: 5.1-5.18.

Kapur, D., Agarwal, K.N., Agarwal, D.K. 2002. Nutritional Anaemia and its control. *Ind J Pediatr.,* 69:607–616.

Ross, A.C. 1999. Vitamin A and retinoids. In: Shils ME, Olson J, Shike M, Ross AC (eds.) Modern Nutrition in Health and Disease. 9th Edition. Lippincott Williams and Wilkins, New York, pp. 305-327.

Singh, M. 2004. Role of micronutrients for physical growth and mental development. *Indian J. Pediatr.,* 71(1): 59-62.

Sommer A, West KP Jr. 1996. Vitamin A deficiency. *Health and Survival and Vision*. New York: Oxford University.

UNICEF, 1998. The State of the World's Children.

Vijayaraghavan, K. 2006. Randomized study of effect of different doses of vitamin A on childhood morbidity and mortality-claming benefit when there is none. Editorial, *Indian J Med Res.,* 123: 583–586.

WHO (World Health Organization), 1996. Indicators for assessing Vitamin A deficiency and their application in monitoring and evaluating intervention programmes. Geneva: WHO.

WHO (World Health Organization), 2001. Iron deficiency anaemia: assessment, prevention, and control. A guide for programme managers. WHO/NHD/UNICEF/UNU [report no. 01.3]. Geneva: WHO.

WHO/UNICEF/ICCIDD, 2001. Assessment of iodine deficiency disorders and monitoring their elimination. A Guide for programme managers. 2nd ed. Geneva: WHO/NHD/01.1.

****