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Micronutrient Deficiency in India

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SUMMARY

Deficiencies in Indian population due to inadequacy of Micronutrients such as iron, vitamin A, vitamin C, iodine, zinc, etc. has received special attention in the recent past. The population groups which suffer most are children, adolescents and pregnant/lactating women. This paper provides an analysis of Micronutrient deficiencies in Indian population utilizing the information from 1950 till date. It has been observed that the level of anaemia which is due to inadequacy of iron continues to be high and there has been very little improvement over time. The problem of vitamin A deficiency is local and focal. However, deficiency due to iodine has declined very significantly. The deficiency due to inadequacy of vitamin C is not significant. There is recent emphasis on deficiency due to Zinc but availability of information is minimal. Thus, there is a need to look into the nutritional programs targeting children, adolescents and pregnant/lactating women to make them more effective.

Key words: Micronutrients, Anaemia, Goitre, Bitot's spot.

1. INTRODUCTION

In India, currently there is more emphasis on micronutrients as compared to macronutrients. This is because micronutrient deficiencies with respect to iron, vitamin A and iodine deficiency disorders continue to be major nutritional problems. Micronutrient deficiencies result from inadequate dietary intake, poor absorption of nutrients, excessive losses, increased requirements or a combination of these factors.

Iron deficiency anaemia (IDA) impairs cognitive performance, behavior, and physical growth of infants, preschool and school-aged children. It affects adversely the immune status and increases the risk of morbidity. It also lowers physical capacity and work performance of adolescents and adults. IDA adversely affects pregnancy outcome by increasing the risk of maternal mortality, prenatal and perinatal loss.

Vitamin A deficiency (VAD) is the most important cause of preventable blindness in young children. VAD generally manifests as xerophthalmia, which includes all ocular manifestations; severe deficiency causes corneal xerosis/keratomalacia leading to irreversible blindness in young children. Even mild vitamin A deficiency, which is more widespread, is associated with increased risk of morbidity and mortality in children.

Iodine is an essential micronutrient for normal growth and development in humans. Iodine deficiency is the most common cause of preventable mental retardation in the world today. Iodine deficiency causes goiter, impaired brain development in the foetus and infant and retarded physical and psychomotor development in the child. The deficiency of iodine also impairs children's learning ability. During pregnancy, iodine deficiency results in still birth, abortion and perinatal deaths.

The importance of eliminating micronutrient malnutrition has long been recognized by India's policy makers and is well-reflected in the country's policy documents: the National Nutrition Policy (1993), which specifies control of micronutrient deficiencies, and the National Nutrition Plan of Action (1995), sets the ambitious goals of reducing anaemia among pregnant women to 25%, eliminating blindness due to vitamin A deficiency, and reducing iodine deficiency disorders to 10% by the

year 2000. More recently, Tenth (2002-07) Five Year Plans envisage the prevention, detection and management of micronutrient deficiencies in children and pregnant and lactating women.

2. COVERAGE AND METHODOLOGY

In view of the importance, an attempt has been made to review the information on prevalence of micronutrient deficiencies (iron, vitamin A, and iodine), dietary intake levels, and to undertake analysis of trends and regional variations. The review is focused on vulnerable populations i.e. children, adolescent girls, and pregnant and lactating women. Information on prevalence of deficiencies and dietary intake of micronutrients from 1950 to date has been reviewed from major studies carried out in the last five decades as well as individual research papers published in various national and international journals.

This effort identified 13 major studies on the subject, providing information on national/regional level, which are mainly multicentre and community based. About 600 published research papers from national and international journals were found having information on prevalence on micronutrients deficiencies and dietary intakes. The number of research studies on iron, vitamin A and iodine were 256, 219 and 87 respectively. As many as 567 research studies were on children, 165 on pregnant and lactating women, but only 62 on adolescent girls. Of these, community based studies accounted for 41%, hospital based for 28%, school based 21% and others fewer than 10%.

Based on the published research papers and reports, data have been analyzed for each micronutrient at national, regional, state and district level separately for infants, children of different age groups, adolescent girls, and pregnant and lactating women. Mapping of the country regarding to prevalence and dietary intake levels of micronutrients have also been attempted.

3. RESULTS

Based on the review, the results on three major micronutrient deficiencies are discussed as under:

3.1 Anaemia

Nutritional anaemia is one of India's major public health problems. The results for children, adolescents and adults are discussed separately.

Infants and children : All India level data available from NFHS 3 (2005-06) for children in the age group 6 months to 35 months indicated the overall prevalence of anaemia as 70%. This shows an improvement of about 5 percentage points over NFHS 2 (1998-99). The prevalence of anaemia is the highest in the northern as well as eastern regions and the lowest in the southern region. Further, the anaemia level is relatively higher among children in the age group 12-23 months as compared to children in the age group 6-11 months and 24-35 months.

As to the trend in the last 5 decades, only a few studies are available previous to 1970 (mainly in the southern and northern regions). For this early period, anaemia among children under 6 years was 77%. The level showed a decline to 72% during 1971-90 and remained at around 70% for the period 1991 onwards. Thus, these data together with latest NFHS estimates reflect little change over time.

Adolescent girls : The number of studies on adolescent girls is limited. The data collected for NFHS 2 for married women in the age up to 20 years and without any child has been used as a proxy for adolescent girls. The analysis indicated that anaemia among this group was about 52%. However, the other major and individual community based studies (1991 onwards) indicated an alarming high prevalence of little less than 90%.

Adult women : As per NFHS 3 (2005-06), anaemia among adult women was 55%. According to the NFHS 2 the overall prevalence of anaemia among pregnant women was 49.7%. However, ICMR multicentre study shows overall prevalence of anaemia among pregnant women at about 85%. Major and individual community based studies (besides NFHS) indicated the highest prevalence of anaemia is in the eastern region and the lowest in the southern region.

Dietary intake : Information from the National Nutrition Monitoring Bureau (NNMB) of ICMR indicates that the average intake of iron is only about 50% of RDA. Iron intake is much lower for children, adolescent girls and pregnant women. According to NNMB data, intake of iron was 44.2% and 45.0% of RDA for 1-3 and 4-6 years old children respectively. For pregnant and lactating women the intake was 36.8% and 48.7% of RDA respectively. The India Nutrition Profile (1998) provides dietary intakes of iron for 182 districts in 14 states. None of the districts had iron intake equal to RDA. Only 6% of the districts were meeting 75% of RDA, 47% were meeting 50% of RDA, and the rest (85 districts) did not meet 50% of RDA.

3.2 Vitamin A Deficiency

The present review indicates a declining trend in clinical vitamin A deficiency (Bitot's spot) in preschool children. The prevalence of Bitot's spot (based on NNMB pooled data of seven states) showed decline from 1.8 in 1975-79 to 0.7 in 1996-97. The review indicated that the prevalence of vitamin A deficiency among children up to six years of age during the period up to 1980 was high at 4%. The prevalence of Bitot's spot based on individual studies for the decade of 90s showed a level around 2%. The current level is 0.7%. It may be mentioned that the prevalence of Bitot's spot more than 0.5% is considered as a public health problem. There are studies at district level (69 districts from 28 states) covering one or more districts per state during the last six years and out of these 69 districts, 44 districts showed prevalence of Bitot's spot greater than 0.5% indicating a public health problem.

The vitamin A deficiency is also measured through prevalence of night blindness. While no data on trends regarding night blindness during pregnancy are available, the current double-digit prevalence in some districts indicates a continuing serious problem. The prevalence of night blindness among children did not show as sharp a decline as observed in case of Bitot's spot.

Available sub-clinical data (serum retinol levels), although limited, indicate the continued high prevalence of vitamin A deficiency among children. Moreover, the average intake of vitamin A is below 50% of RDA in most parts of the country.

3.3 Iodine Deficiency Disorders

It has been estimated that 200 million people in India are exposed to risk of iodine deficiency and more than 70 million suffer from goiter and other iodine deficiency disorders (MOHFW 2005). Importantly, the ban on non-iodized salt lifted in September 2000 was re-imposed in November 2005. As per NFHS 3, about 75% of the population use iodized salt. However, the proportion of households taking adequate iodized salt of 15 + ppm was just little over 50% which is same as that observed during NFHS 2 (1998-99). An ICMR study (District Nutrition Project, 2001) indicated the average prevalence of goitre among children (6 to < 12 years) from 15 districts as 4.78%. The prevalence of grades I and II goitre was 4.66% and 0.12% respectively. Up to 1990, prevalence among children (6 to < 12 years) averaged 26%. The problem was most severe in the eastern regions (at 50%). Based on individual studies conducted from 1991 to the present, the average prevalence of goitre (grades I & II combined) over this time was about 10%. A multicentre ICMR study on prevalence of iodine deficiency disorders and cretinism in all populations of 14 districts of 9 states during 1985-86 indicated overall prevalence of 21%. Five of these fourteen districts were re-surveyed in 1998-99 and data of three districts are available. A comparative picture indicated a declining trend in the prevalence of goitre for those years.

According to Ministry of Health and Family Welfare (2002) out of 310 districts surveyed for iodine deficiency disorders, 253 districts were found endemic.

4. STATISTICAL ISSUES

Although in major surveys the sampling and the sample size are appropriate for deriving inferences, the individual studies lack in terms of appropriate sampling and adequate sample size for their use in the review. Importantly. the sample size required for studies dealing with rare attributes such as prevalence of Bitot's spot

and goitre is very high which is not the case always. Further, different studies used different designs. Again the criteria used in the analysis is not standard specially for anaemia as different studies used different cut offs of Hb level in catagorising an individual as anaemic. Some of the studies were hospital and school based. Though, these have put some limitations on comparability of data emerging from different sources still useful information could be gathered by data mining and appropriate statistical handling.

5. RECOMMENDATIONS

The prevalence of anaemia is high in all vulnerable groups (children, adolescent girls and pregnant and lactating women) and in almost all states of the country. The present review reveals that this high prevalence has changed very little in the last 50 years, indicating need for policy and programmatic analysis.

A number of policy and program efforts have been made for the prevention and control of anaemia. Despite the various policy measures and the implementation of a national anaemia prophylaxis program since 1970, the prevalence of anaemia is unacceptably high. Clearly the situation requires consideration of approaches to improve logistics, coverage and compliance of existing programs and a critical need to operationalize the policy guidelines on screening and treatment of women and children. A serious consideration of adoption of approaches such as the life cycle approach including intervention for adolescent girls, iron syrup for young children and other strategies such as fortification is important.

Clinical manifestation of vitamin A deficiency has shown decline over time. The prevalence may be low and vary from district to district still vitamin A deficiency remains a threat to the health of India's children. Moreover, the average intake of vitamin A is below 50% of RDA in most parts of the country. Although the national prophylaxis program against nutritional blindness began in 1970, coverage continues to be a concern. Thus, there is need for action to adopt effective strategies to improve coverage as well as to operationalize the recommendations on screening and treatment of vitamin A deficiency in pregnant women and children.

The prevalence of goitre has shown very steep decline from the level about 20% to about 5%. The prevalence of grade II goitre is very low only about 0.1%. India enacted the Universal Salt Iodization code in 1986 which was repealed in 2000 and re-imposed in 2005. Although it is difficult to make definitive statements relating iodized salt with IDD prevalence trends, the declining trend in IDD seen following the adoption of the Salt Iodization code is certainly suggestive of the benefits of the program.

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