

## Editorial

# Scientific Rationale for Targeted Vitamin A supplementation to Children in India

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In India, presently Vitamin A deficiency (VAD) is common amongst young children belonging to the underprivileged populations. The risk of deficiency is greatest in children under three years because their requirements are relatively higher and dietary intake is low. Also, these have higher risk of illnesses such as diarrhea, acute respiratory tract infection and measles, which deplete vitamin A reserves. In India, Severe deficiency of VA with corneal involvement was an important cause of nutritional blindness in sixties and early seventies children amongst children belonging to poor communities however presently, this is an extremely rare disease.

### VAD Status in India

Presently, Vitamin A deficiency (VAD) is a public health problem in selected geographical pockets in India. There are wide variations in between the states and within districts of the same state. The scientific evidence indicate that there has been a declining trend of VAD in last 20 years in the all the states of the country.

Surveys conducted by the Indian Council of Medical Research in the year 1999-200 in 16 districts in different regions of the country, in which >11 000 children per district were evaluated with the use of the 30-cluster approach, found only 3 districts ( table 1 )had Bitot's spot, a marker of vitamin A deficiency, more than 0.5 % ,( a prevalence for Public health problem in a region). (1)

### Table 1: Prevalence of Vitamin A Deficiency: Bitot's Spot in Children (<6 Years)

Name of district	Number of children	Bitot's spot No. (%)
<b>NORTH</b>		
Mandi	10589	NIL
Dehradun	8912	NIL
Badaun	10782	NIL
Mainpuri	5562	1 (0.02)
Baramulla	10766	3 (0.03)
Srinagar	9713	4 (0.04)
Lakhimpur Kheri	11026	51 (0.46)
Bikaner	10730	118(1.10)
<b>EAST</b>		
Bishnupur	11068	7 (0.06)
Kohima	11079	27 (0.24)
Dibrugarh	10754	32 (0.30)
Nagaon	10696	32 (0.30)
Patna	10739	334 (3.11)
Gaya	10711	505 (4.71)
<b>SOUTH</b>		
MehboobNagar	10343	38(0.37)
<b>WEST</b>		
Raigarh	11042	3 (0.03)
<b>ALL DISTRICTS</b>	<b>164512</b>	<b>1155 (0.70)</b>

Repeat surveys by the National Nutrition Monitoring Bureau (NNMB) in Andhra Pradesh, Gujarat, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Orissa and Tamil Nadu, (1975-79 ,1988-90, 1997 -1998 ) has also documented a decline in the overall prevalence rate of Bitot's spots from 1.8% to 0.7% in the pre-school age children in the 8 states surveyed. (2)

### Current Strategy of VAS

The National Programme for Prophylaxis against Nutritional Blindness (NPPNB) due to VAD involving administration of massive doses of vitamin A was initiated over 40 years ago, at a time when VAD was a major public-health problem. This approach was envisaged purely as a short-term emergency measure and as an adjunct to dietary improvement. To begin with , under the programme the children in the age group of 1-5 years were provided a mega dose of Vitamin A (2 Lakh International Unit) at six monthly intervals. The priority was given to the geographical areas where cases of vitamin A deficiency were reported by the Health workers (3).

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Presently the program of universal Vitamin A supplementation in India is advocated on the ground that it could bring about an overall reduction in mortality by 23 %. Although, this debatable claim has been found only in clinically vitamin A deficient endemic areas with rudimentary health care facilities. The exact metabolic mechanisms involved in bringing about this mortality reduction is not known, apart from conjectures. (4)

The claim of mortality reduction largely rests on the findings of investigators belonging to the John Hopkins School. However, the investigations from two other prestigious schools- Harvard School of Public Health and the National Institute of Nutrition (NIN), India had failed to substantiate the mortality reduction claim. The double blind carried by National Institute of Nutrition, was done under the epidemiological conditions prevailing in the country (India) and documented the lack of effect of the VA supplement *per se* on mortality (5).

The major causes of infant mortality in developing countries including India and particularly the districts in which the above study was conducted are: diarrhoea, respiratory infections and low birth weight (prematurity). These causes contribute to more than 80% of the infant mortality beyond first month of life. Also the existing scientific evidence indicate that Vitamin A supplementation do not help in reduction of morbidity and mortality due to diarrhoea and respiratory infections. (6)

#### Side Effects of Mega dose of VAS

The mega dose of VA (2 Lakh International Unit) is about 500 times of the RDA (400 IU) for the children in this age group. This is a pharmacological dose and adverse side effects have been reported. The observation of large increase in rate of pneumonia in well-nourished children who received 10000 IU of vitamin A weekly and reduced CD+3/CD+4 cells in elderly vitamin A supplemented subjects and the differential effect of VAS in pneumonia and diarrhea, raise the question of enormous public health implications. Excessive Dietary Intake of Vitamin A is Associated with Reduced Bone Mineral Density and Increased Risk for Hip Fracture. The adequate data is not available on this aspect. (7-10)

A significant part of the overall development of the brain takes place in young children below three years of age. It has been estimated that as many as 6,000 to 10,000 synaptic connections between neural cells, which determine behavior and overall mental development take place in young age. It has been documented that nearly 12 percent of young children given 50,000 IU developed fontanelle bulging following vitamin A administration (7). In India, 47 % of children suffer from moderate grade of under-nutrition. Subjecting these under three children to repeated episodes

of increased intra-cranial tension could contribute to further retardation of their brain development.

#### Why Targeted Administration of VAS

During last 40 years indicators of child health have shown remarkable positive improvement in different states in the country. The prevalence of severe malnutrition has come down from 20% in 1975 to less than 4 % in 2008. Also, the immunization coverage for measles and other vaccine preventable diseases has improved from earlier 5-7% in seventies to presently 60-90%. Similarly, there has been a significant improvement in the dietary intake of vitamin A rich foods. The improved health infrastructure has significantly contributed to better health care facilities and decrease load of morbidity amongst children. All these factors jointly positively influenced the VA status of children and reduction of losses of VA from the body and thereby reducing the prevalence of VAD in the country. Hence there is need of targeted distribution of VA in areas where the cases of Night blindness are reported to or seen by the health functionaries. The administration of Vitamin A should be part of routine primary health care activities and responsibilities of the multipurpose workers. The six monthly campaign approach should be avoided as it disturbs the routine health care activities of the worker. Also the emphasis in these campaigns is to achieve the targets of campaign and no efforts is made to provide health education to the mothers of the beneficiaries, which is the major intervention for the sustainable elimination of the VAD from the area. The identified geographical regions of states of Bihar, Rajasthan, Uttar Pradesh, Madhya Pradesh etc where VAD is reported may be given high priority and simultaneously the states from where no cases of VAD has been reported administration vitamin A administration may be discontinued to have most cost effective utilization of limited resources available in the health sector. The extra budget available may be spent on prevention and management of Anaemia which is more wide spread and have serious health consequences amongst mothers and children.

It is an ethical issue whether universal VA supplementation should be continued in states like Kerala, where every year, annual surveys of NNMB conducted, during 1977 to 2001, have not even once documented, VAD as a public health problem. Similarly, no study till date has documented VAD as a public health problem in Himachal Pradesh.

#### Conclusion

In view of the changing scenario of the child health in the country improvement in the nutritional status, dietary intake, immunisation status, virtual elimination of nutritional blindness, there is a need of revisiting the programme

objectives and its implementation. What we need is to have area specific strategies and criteria which should decide areas where VAS should be done and or discontinued.

The era of gross and rampant vitamin A deficiency leading to blindness is past in India. The sustainable solution of prevention and control of VAD is through promotion of the intake of green leafy vegetables (GLV) and local available foods. The intake of GLV can be answer to more than the problem of VAD. GLV are good sources of carotenes, folic acid, vitamin C, iron and calcium and can therefore contribute improvement of the overall nutritional status of children.

The micronutrient deficiencies are often the result of lack of enough habitual food in the household rather than to the poor quality of such foods. When overall food intake becomes adequate enough to provide basic energy needs, needs of other nutrients would be met to a considerable extent even with the current diets.

The food-based approach to combat VAD in non-clinically deficient areas is the sustainable and cost effective solution. It is unfortunate but true that at present with a solution in hand, we are chasing a problem. We should look to our farms not pharmacies, for the nutritional improvement of our children. Solutions to the problem of VAD must be 'food-based' – not 'drug-based'.

Amongst the four micronutrients the International agencies and scientists are finding possibly vitamin A as sexy, zinc as gorgeous, iodine as attractive and iron as insipid and accordingly the priority is being accorded, on their research and supplementation.

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