

RISK FACTORS OF NUTRITIONAL BLINDNESS AND DETERMINANTS OF A SUCCESSFUL VITAMIN A PROPHYLAXIS PROGRAMME

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ABSTRACT

Data of 7668 children (0-72 months) and their 4621 mothers and 81 Anganwadi Workers (AWWs) collected for the USAID Assisted ICDS Evaluation Surveys were analysed. The results indicated that the major risk factors of nutritional blindness were lack of nutrition and health knowledge among mothers; presence of iron deficiency anemia in the children; and history of the child having had measles in the past one year. Mother's health and nutrition, knowledge and maternal literacy status were the determinants of the success of a vitamin A prophylaxis programme. Factors that determined AWWs performance in vitamin A supplementation were her nutrition and health knowledge, her literacy status and the amount of supervisory assistance she received from Auxiliary Nurse Midwife (ANM).

Key words: *Nutritional blindness, Vitamin A prophylaxis, Anganwadi worker.*

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Vitamin A deficiency resulting in nutritional blindness and death continues to be a major public health problem in the developing countries(1-5). Interrelationship between vitamin A deficiency and malnutrition(4,6), morbidity[^]) although not conclusive, has been reported. More recently(8) in hospitalized children, supplementation of vitamin A within 5 days of rash resulted in speedier recovery and significant reduction in frequency and severity of post measles respiratory tract complications. The authors attributed this effect of vitamin A supplementation to re-establishment of the integrity of the epithelial tissues of the respiratory and gastrointestinal tracts.

Subjects and Methods

The USAID assisted ICDS impact evaluation surveys have been conducted in Panchamahals and Chandrapur districts of Gujarat and Maharashtra States, respectively. For these surveys based on the population size, 3 to 7 villages (Anganwadi Centres) per block (sub-district administrative unit) were randomly selected from the USAID assisted 11 ICDS blocks in Panchamahals and 8 blocks in Chandrapur. All the families residing in the selected villages were surveyed. Data of 7668 children (0-72 months) and their 4621 mothers and 81 AWWs collected in the year 1989-90 are presented here.

Data on socioeconomic and socio-cultural factors were collected with the help of pretested, precoded questionnaires by trained investigators working in pairs comprising a medical intern and a nutritionist/social scientist.

The children were examined for ocular signs of vitamin A deficiency(3) by the medical interns and history of night blindness was elicited by questioning the mothers. The weight and height of children were measured to the nearest 0.1 Kg and 0.1 cm, respectively(9). Presence of anemia in terms of pallor sign was detected by the Anemia Detection Card developed by the Voluntary Health Association of India.

Mothers of the children and AWWs were interviewed to record their literacy status and nutrition and health knowledge. AWWs were asked to state the number of visits made by the ANM to her AW in the past 3 months and guidance given to her by the ANM on her visit to the AW.

Nine or seven questions on nutrition and health posed to mothers of these children or AWW, respectively related to: (i) weaning age and type of weaning food; (ii) frequency of feeding; (iii) diet during diarrhea; (iv) management of diarrhea (mother); (v) awareness of oral rehydration therapy and preparation of oral rehydration solution; (vi) cause of protein energy malnutrition; (vii) treatment of protein energy malnutrition; (viii) growth chart knowledge; and (ix) mother's perception of her own child's nutritional status. Mother's or AWW's nutrition knowledge score was the total of all the correct responses made by her with maximum obtainable score of 9 or 7, respectively. The activity score of ANM was the total number of the activities she performed or gave guidance for on her visit to the AW. The activities considered were: (i) immunization; (ii) weighing of children and nutritional gradation; (iii) health check-

ups; (iv) vitamin A distribution; (v) iron/folic acid tablets distribution; (vi) home visits; (vii) nutrition, family planning and health education; (viii) referrals, and (ix) treatment of primary ailments.

Data were processed and analysed on IBM compatible PC/XT using SPSS/PC(10).

Results

(a) Risk Factors of Nutritional Blindness

Maternal Level Factors: Poor nutrition and health knowledge and frequency of feeding a young child less than three times a day significantly increased the risk of xerophthalmia. Literacy status of the mothers on the other hand, was not a risk factor. As a matter of fact, significantly larger percentage of children of literate than illiterate mothers exhibited vitamin A deficiency eye signs (Table I).

Child Level Factors: Severely malnourished children (weight for age less than 60% NCHS median) were less prone to xerophthalmia than the not so severely malnourished plus normal children. History of having had measles in the past one year and presence of anemia were significantly associated with vitamin A deficiency. History of diarrhea in the past one year did not have significant association (Table II).

Socioeconomic Level Factors: Neither poverty nor child's birth order of two or more were the risk factors for xerophthalmia (Table III).

(b) Determinants of a Successful Vitamin A Prophylaxis Programme

Regression analysis indicated that

TABLE I- Risk Factors of Nutritional Blindness: Maternal Factors

Factors	Prevalence of Vitamin A deficiency			X ²
	n	%		
Nutrition knowledge				
Adequate (n = 570)	23	4.0		5.37*
Poor (n=4051)	265	6.5		
Literacy status				
Literate (n = 882)	71	8.0		6.16*
Illiterate (n = 3735)	217	5.8		
Frequency of feeding children				
>3 times a day (n = 1648)	59	3.6		30.80**
<3 times a day (n = 2337)	229	7.7		

Figure in parentheses denote sample size.

Adequate: 3 or more correct responses-maximum 9; Poor: Less than 3 correct responses-maximum 9.

*P <0.05, ** P <0.0001.

TABLE II- Risk Factors of Nutritional Blindness: Child Factors

Factors	Prevalence of Vitamin A deficiency			X ²
	n	%		
Nutrition status				
>60%10 NCHS median weight for age (n=7028)	518	7.4		6.40*
≤60% NCHS median weight for age (n=573)	26	4.5		
Morbidity status				
Measles Yes (n = 1149)	100	8.7		5.67*
No (n = 6444)	435	6.8		
Diarrhea Yes (n=2843)	172	6.0		6.88*
No (n=4750)	363	7.6		
Anemia Yes (n=1165)	229	19.7		326.27**
No (n=6501)	317	4.7		

Figures in parentheses denote sample size.

* p <0.05,** P <0.0001.

maternal nutrition and health knowledge and her literacy status determined the success of vitamin A prophylaxis programme (Table IV).

(c) Factors Affecting Efficiency of AWW in Vitamin A Supplementation

The work efficiency of AWW was evaluated in terms of coverage of children for vitamin A supplementation in relation to her educational level, knowledge of nutrition and health and supervisory assistance received by her from the ANM.

The AWW's nutrition and health knowledge alone or in combination with her educational level and the supervisory assistance received determined the work efficiency of the AWW (Table V).

Discussion

Adequate nutrition and health knowledge of mothers regardless of their literacy status was an important contributory factor in the control of xerophthalmia. In conformation with the reported literature, measles(2,7,11) and anemia(7,12-14) were the major risk factors. The association between anemia and vitamin A deficiency perhaps is due

to vitamin A induced changes in structure/function of the erythrocyte membrane.

Although widely believed that diarrhea especially repeated and prolonged is a risk factor for vitamin A deficiency, particularly in children whose liver

stores of vitamin A are low(15,16), no association between diarrhea and xerophthalmia has also been reported(17-19). The findings of a study in West Java(20) as a matter of fact are suggestive of xerophthalmia being a risk factor for diarrhea and not vice versa.

Similar to earlier reports(21,22) severe malnutrition was not a risk factor for xerophthalmia. It has even been reported(23) that malnourished children may not show signs of vitamin A deficiency even when their intake of vitamin A is inadequate. However, association between vitamin A deficiency and stunting(6,24-25) and wasting(26) has been reported.

The success of a vitamin A prophylaxis programme was determined by the mother's nutrition-health knowledge. Equally important was the AWW's nutrition and health knowledge, her educational level and supervisory assistance received by the AWW from the ANM. Similar findings have been reported earlier(27). Regular visits by the ANM or other health functionaries to the AW can strengthen the on-the-job training component for the AWW which in turn, improves her job efficiency(28,29). Bagchi(30) had earlier

TABLE III—*Risk Factors of Nutritional Blindness: Socioeconomic Status*

Factors	Prevalence of Vitamin A deficiency		
	n	%	X ²
Economic status			
Above poverty line (n=3578)	288	8.0	8.47*
Below poverty line (n=4089)	259	6.3	
Child's birth order			
First (n=1794)	127	7.1	0.01
<2 (n=5874)	420	7.2	

Figures in parenthesis denote sample size. Poverty line: Rs. 68 per capita per month. (Source: VII Five Year Plan Document Vol II, page 55,1985-90). * p <0.05.

TABLE IV—*Mother Level Variables Associated with the Success of Vitamin A Prophylaxis Program—Regression Analysis*

Independent Variables	B	SE B	T
Maternal nutrition knowledge	0.048	0.009	5.391**
Maternal literacy status	0.150	0.034	4.374**
Constant	1.217	0.042	29.008**

** p <0.0001.

TABLE V—*Determinants of AWW's Efficiency for Delivery of Vitamin A Prophylactic Doses—Regression Analysis*

Independent variables	B	SE B	T
AWW's nutritional knowledge	0.020	0.005	4.318**
AWW's literacy status	-0.004	0.012	0.353
ANM's visits (in past 3 months)	0.009	0.002	5.657**
ANM's activity score	0.039	0.004	8.679**
Constant	1.037	0.028	37.769**
R ²		0.05707	

** p < 0.0001.

recommended that besides adequate training, the community workers need to learn the technique of communicating with the community.

In conclusion, the major risk factors for nutritional blindness appear to be lack of child care knowledge among mothers; presence of anemia in children; and history of the child having had measles in the past one year. The determinants for the success of a vitamin A prophylaxis programme were maternal child care knowledge and maternal literacy status.

The efficiency of the AWW in delivery of vitamin A was determined by the AWW's nutrition and health knowledge; the guidance she received from the ANM; and her educational level. This study suggests that the programme strategies to minimize risk factors and to improve the coverage of vitamin A supplementation are as under: (i) Ensure adequate supply of vitamin A; (ii) Strengthen immunization against measles; (iii) Improve coverage of chil-

dren for iron-folic acid tablet distribution; (iv) Enhance mother's nutrition and health knowledge, particularly in the area of vitamin A deficiency and frequency of feeding the young child; (v) Improve job competency of AWW by refresher courses/on-the-job training; and (vi) Improve counselling skill of AWW and ensure supervisory assistance to her.

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