Original article

Xerophthalmia in children of Torbayo village, West Hararghe

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Abstract: A cross-sectional study was conducted in children below the age of 14 years in Torbayo village, West Hararghe, during the month of February 1991 to determine the prevalence of Xerophthalmia. Every third household with children below 14 years (n=373, 32.3%) was randomly selected and the children were convened in a central place for examination of the signs and symptoms of Xerophthalmia, morbidity and nutritional status. A total of 132 children were found to have xerophthalmia, of which 70(18.8%) had night blindness and 55(14.7%) had Bitot's spots. According to WHO, this appears to be of public health significance. Males were affected slightly more than females(4.2% vs 3.9%), and school children were noted to be affected more than preschool children. Though the levels of wasting and stunting which were 39(10.5%) and 133(35.7%), respectively, appear to be high, no significant association was observed with the clinical manifestation of vitamin A deficiency. In conclusion, the prevalence rate of X1B of 14.7% is amongst the highest rates reported in the world and, therefore, we recommend periodic vitamin A supplementation until dietary intervention takes place.[*Ethiop. J. Health Dev.* 1998;12(1):39-43]

Introduction

Vitamin A deficiency(VAD) is a major public health nutritional problem in many developing countries and is one of the most important causes of preventable blindness(1). It is thought to cause blindness in 250,000-500,000 children each year; two thirds of these children die within months of going blind due to their increased susceptibility to infections also caused by this deficiency(2). The incidence is high in preschool age group, and males are more affected than females(2,3,4).

Xerophthalmia remains the most specific and readily recognized clinical manifestation of VAD and has served the definitive criterion for assessing vitamin A status(5). Recent studies demonstrated vitamin A to play a major role in reducing morbidity and mortality(3). These effects are thought to be mediated through the action of the immune response(6).

The cause of VAD can be quite complex and depends on the type and amount of vitamins consumed and metabolic needs of the individual(2).

In Ethiopia VAD is a well recognized problem(7,8). According to the national survey carried out by the former Ethiopian nutrition Institute (ENI), nearly 1% of the children were found to have Bitot's spot, clinical signs for VAD, and over 16% of the young children had subclinical forms.

The survey also revealed xerophthalmia to be more evident in the pastoral and cropping ecozones(7). Western Hararghe was reported to be one of the most affected areas; this has been evidenced by several pocket studies carried out at different times by the former ENI(unpublished data).

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The purpose of this survey is to estimate the magnitude of vitamin A deficiency in this village in children below the age of 14 years; distribute vitamin A capsules for all the children: draw serum for confirmation and use it as a basis for community-based periodic vitamin A supplementation.

Methods

A cross-sectional study was conducted to determine the magnitude of vitamin A deficiency in Torbayo village, a semi-cash crop eco-zone in West Hararghe, between February 2 and 29, 1991. This village was initially reported[1] to have an outbreak of xerophthalmia for which the former ENI was contacted to do the survey and take the appropriate measures.

Prior to the survey, a fresh list of the households with children below the age of 14 years was prepared. From this list, every third household with children (<14 years) was selected randomly and examined for signs and symptoms of Xerophthalmia. Demographic variables, such as age and sex, and morbidity information were collected with the help of the respective mothers of the selected children using a structured questionnaire.

In order to maintain standardization of the results, the diagnostic methods were practised and standardized by the examiners for a day before the actual survey took place in the study site and recorded the results according to the WHO classification(2,9,10). Weight was measured using a hanging salter spring balance with a capacity of 25kg. for children below two-years of age and an upright adult scale for those above two years. Readings were made to the nearest 0.1kg. For children under two years of age, length was measured by having them lie down on a wooden length board with a flat surface. Older children were measured using a vertical, fixed rod attached to the adult scale. Length was recorded to the nearest 0.1 cm. Following the Waterlow classification system(11), children were then classified as normal weight(wt)/height(ht) and ht/age above 2SD), stunted (below -2 SD Ht/Age), wasted(below -2SD Wt/Ht), or stunted and wasted.

For gross comparison with other similar studies done earlier(7,8,12,13), the peak age groups were categorized into pre-school and school children but detailed disaggregation of the data was not done due to the small size in each age interval. Vitamin A capsules were distributed to all the children, and blood samples were collected from every other child aseptically, after an informed consent was obtained from the parents, for confirmation and use as a basis for community-based periodic vitamin A supplementation. The data obtained were then entered into a computer using SPSS/DE and analyzed by SPSS and CASP software. The EPI-INFO program was also used to assess the strength of the associations. Chi-square was used to compare significance of differences. P-values less than 0.05 were considered significant.

Case definitions

XN = Night blindness (the local term used to describe XN in this village is abenesso or berberetti and mothers were asked to describe the problem if their children suffer from XN in local terms) X^1B = Bitot's spot X_2 = Corneal xerosis

X_3 = Corneal ulcer X_s

= Corneal scar **Results**

In a total of 260 households, we studied 373(32.3%) children. Of these, 230(61.7%) were preschool children while 143(38.3%) were school children with a male to female ratio of 1 to 1.05 and a mean age of 6.5 years (Table 1). The eye examination results are presented in Table 2. The prevalence rate of X_1B exceeds the WHO criterion of 0.5% suggested as the level for declaring vitamin A

Table 1: **Age and sex distribution of the surveyed group, Torbayo, West Hararghe, 1991.**

Age in months	Sex		Total	Percent	cumulative Percent
	Males	Females			
< 12	21	25	46	12.33	12.33
13 - 24	29	17	46	12.33	24.66
25 - 36	18	20	38	10.19	34.85
37 - 48	13	20	33	8.85	43.70
49 - 60	16	17	33	8.85	52.54
61 - 72	19	15	34	9.12	61.66

> 72	66	77	143	38.34	00.00

Table 2: **Distribution of age with types of Xerophthalmia, Torbayo, West Hararghe, 1991.**

Types of Xerophthalmia	Age in months		X^2-value	P-value
	PSC*(≤72)	SC**(>72)		
XN	38(16.5)	32(22.3)	1.98	0.157
X_1B	25(10.7)	30(20.90)	7.16	0.007
X_2	3(1.3)	1(0.7	.30	.58
X_3	1(0.4)	1(0.7)	0.115	0.73
X_s	-	(0.7)	-	
Total	67/230	65/143		

*Preschool children **School children

deficiency and xerophthalmia as a public health problem in all the age groups. The estimated prevalence of corneal ulcerations in these children also exceeds the WHO criterion of 0.01%, which provides further evidence of the problem. In this study, Bilateral Bitot's spots(X_1B) were found to be more common than unilateral eye lesions (Table 3). The most affected groups were school children (Table 2) with preponderance of male sex (Table 3).

Children who had trachoma, diarrhoea, cough and fever and measles during the survey were found to be 49(13.1%), 61(16.4%), 48(12.9%), and 2(0.5%), respectively. No trauma to the eye was reported during the examination. There were few Bitot's spots seen combined with trachoma, diarrhoea, cough and fever cases; no close association was observed in this study (Table 4). Interestingly, there was no child who had measles and Bitot's spots. The levels of stunted, wasted, and both stunted and wasted were found to be 133(35.7%), 39(10.5%), and 15(4.0%) respectively. Of these, Bitot's spots was found in 26(19.4%) stunted and 4(10.2%) wasted children. No significant association of the ocular lesions of vitamin A deficiency was observed with malnourished children (Table 4).

Discussion

The overall survey yielded some useful prevalence data on vitamin A deficiency status in TORBAYO village. It also showed the age groups commonly affected and common types of child illnesses which are usually associated with vitamin A deficiency status.

Although males were found to be affected more than females in this study, the difference noted is not statistically significant ($p>0.05$) when X_1B is conidered (Table 4). The observed high rate in males is primarily said to be culturally associated mainly due to low access of males to food, and to some extent higher physiological susceptibility (14). But the results obtained by Giuseppe De Sole on vitamin A deficiency and Xerophthalmia in the southern Ethiopia in 1983 and results noted by Zewdie and Teshome on vitamin A status survey of pre-school children in Ethiopia during 1980/81 were different from our findings (7), although this may be due to our sample size.

Table 3: **Types and characteristics of Xerophthalmia by sex, Yorbayo, West Hararghe, 1991.**

Types of Xerophthalmia	Sex and Characteristics of xerophthalmia			
	Male	Female	Male	Female
	Bilateral		Unilateral	
X_1B	20(6.00)	14(4.20%)	13(3.90%)	8(2.40)
X_2	2(0.60)	2(0.60)	-	
X_3	-	-	1(0.30)	(0.30)
X_s	-	-	-	(0.30)
Total	22(6.60)	16(4.80)	14(4.20)	10(3.00)

X^2value=3.29 P-value=0.07

In the present study, school children were found to be affected more than the pre-school children; the difference observed is statistically significant when Bitot's spot is considered ($p<0.05$). This might possibly be due to increased demand of Vitamin A in relation to growth, and increased risk of infection which leads to increased vitamin A requirement in this age group. Similar results were also found by Giuseppe De Sole (14,15). Eventhough it is usually common to see a close association between Xerophthalmia and morbidities like acute respiratory diseases, measles, malnutrition, and gastroenteritis (16), none of them was observed to have an associations in our study. This might be due to the seasonal factor. Of the 48 children observed to have cough and fever, possibly pneumonia, only 9(18.6%) of them had the eye lesions(X_1B). Although pneumonia is said to have an association with vitamin A deficiency (16,17,18), this was not demonstrated in this study.

The high level of malnutrition might be due to the food shortages that followed the drought of 1990 and the concurrent effect of infection. However, no significant association of

Table 4: **Relationship of morbidity status with Bitot's spot among the surveyed group, Torbayo, West Hararghe, 1991.**

Type of Morbidities	Children with		
	Bitot's spots	X^2Value	P-Value
Trachoma	11(22.4)	2.66	0.1(NS)
Diarrhoea	16(21.3)	2.50	0.1(NS)
Cough &Fever	48(18.8)	0.70	0.4(NS
Stunted	26(21.8)	3.60	0.05(NS)

NS=Not significant

xerophthalmia (X_1B) was observed with the nutritional status of the children. Although, a previous study in the region by the principal author indicated close association of xerophthalmia with stunting, this is not seen in this study. This might again be due to our sample size (13).

Early signs of xerophthalmia (XN, & X_1B) were found to be common and accounted for 94.7% of all eye lesions. This probably suggests the problem to be at its earlier stage which can be reversed with prompt actions (see Table 2). Eye lesions in vitamin A deficient children are frequently of bilateral types (2,13,14). Similar findings are also found in this survey which probably indicate the etiology of the eye lesion to be nutritional in origin.

In conclusion, the survey conducted in Torbayo village has revealed VAD to be one of the major causes of the reported eye problems and therefore, vitamin A capsules were distributed to all the children.

The overall prevalence rate of X_1B of 14.7% appears to be amongst the highest rates reported in the world and, therefore, we recommend periodic vitamin A supplementation until dietary intervention takes place.

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