

## Original article

# Vitamin A status in three woredas of Kambatta, Alaba, and Timbaro Zone, Southern Peoples's Region

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**Abstract:** As a part of comprehensive evaluative study on various strategies to control Vitamin A Deficiency (VAD), a baseline survey was conducted in three woredas of Kambatta, Alaba, and Timbaro Zone (KAT) in Southern Nations, Nationalities and People's Region in 1996. A total of 4123 children from randomly selected peasant associations were clinically examined for signs of xerophthalmia while blood samples were collected from a systematically selected 197 children for serum retinol analysis. Results indicate that 1.2% (51) of the children had a history of night blindness and 0.2% (8) had bitot's spots. Most cases of bitot's spots (6 out of 8) were in the age range of 36-72 months. The prevalence of bitot's spots was higher in male children compared to female children (5 and 3 respectively). Over a quarter of children (27.9%) had low serum retinol concentrations, while 4.6% had deficient serum retinol concentrations. Nearly equal numbers of male and female children (4 and 5 respectively) had deficient levels of serum retinol concentrations while more male children had low serum retinol levels compared to female children (28 and 17, respectively). The high prevalence of night blindness (WHO's cut-off point of 1%) and serum retinol levels (WHO's cut-off point of 20% less than or equal to 0.70  $\mu\text{mole/l}$ ) indicates that VAD is emerging as a public health problem in an area previously considered free of VAD. These findings justify the need to strengthen the intervention strategies underway in the area. [*Ethiop. J. Health Dev.* 1998;12(3):225-229]

## Introduction

Several studies have established that vitamin A deficiency is a major public health problem in Ethiopia. Studies as early as 1960 and subsequently have unanimously indicated that VAD is one of the serious nutritional problems contributing to child mortality and blindness in the country. In 1957/58 postumus conducted a clinical examination of xerophthalmia on 7,000 pre-school and school age children and he found that 9 percent of the girls and 2.2 percent of boys showed bitot's spots while approximately half of them had conjunctival xerosis (1). Subsequent survey of the interdepartmental committee on Nutrition for National Defence in 1959 also indicated that about 10 percent of pregnant women had vitamin A level of less than 10 $\mu\text{g}/100\text{ ml}$  (2). The survey also showed bitot's spot in 2% and 0.4% of males and females, respectively. Analysis of the per-capita dietary intake also indicated that deficiency of vitamin A was wide-spread. A prevalence survey in 1987 by Gusepe de Sole et al in Bale and Arsi zones indicated a prevalence rates of 5%, 8%, and 0.05% for bitot's spots, corneal xerosis/keratomalacia, and corneal scars, respectively (3). A recent study in 1993 on 2005 children in four woredas of Arsi Zone revealed that the overall xerophthalmia prevalence rate was 10.9% (4). In more recent studies

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undertaken in Tgrai and Harari Regions it was observed that the prevalence of xerophthalmia is one of the highest ever recorded. In Harari Region almost all children had low serum retinol levels, while almost 20 fold (compared to WHO's cut-off points) prevalence rate of bitot's spots was observed in both regions (5).

Studies conducted in Enset growing regions of the country however indicate that VAD is not as serious a problem as in the cropping and pastoral regions of the country. A study in school children in North Shoa, Kembatana Hadiaya, Selale, and Gurage areas indicated that the average mean prevalence of bitot's spot for males and females was 0.91% (6) with a very low prevalence in the Enset staple areas compared to cereal staple areas.

A national assessment of vitamin A status of children less than six years of age was carried out by the former Ethiopian Nutrition Institute in 42 semi-urban survey sites representing four ecological zones which were identified based on the type of staple food crops (7). Results of the survey indicated that the over all bitot's spot rate is 1%, which is twice that of the cut-off point (0.5%) set by WHO as indicating a problem of public health significance. According to this rate about six to eight million of the under 6 children in the country are estimated to be at risk of vitamin A deficiency. The prevalence of bitot's spot was found to be higher among children in pastoral areas (1.6%), followed by those living in grain-cropping (1.1%) and cash cropping zones (0.4%) and overall serum retinol levels were deficient in 16% and low in 44% of the children. No clinical case was reported from the "Enset" (Enset Ventricosum, commonly known as false banana) staple area. This was attributed to the high consumption of livestock products, and green leafy vegetables, particularly kale, along with Enset.

With the rapidly increasing population in the area and cattle rearing becoming more difficult, the favourable situation that existed previously is most unlikely to continue. Monitoring the situation with frequent surveys appears to be extremely important in order to avoid potential health consequences of VAD. This paper is intended to bring to attention the current VAD status in one of the major Enset growing region of the country.

## Methods

As the purpose of the comprehensive study was to compare the impact of universal vitamin A capsule supplementation through the health sector (EPI+) and universal vitamin A capsule supplementation along with other non-health avenues (WIBS), which were launched a few months prior to the study, one WIBS (Angacha), one EPI+ (Kadida Gamela), and one control (Kacha Birra) woredas of KAT Zone were randomly selected. In each of these woredas five peasant associations were randomly picked. All children were examined for signs of xerophthalmia, and from among them, blood samples were collected from systematically selected 197 children for the serum retinol analysis. Three physicians trained and standardized by an ophthalmologist undertook clinical assessments. Venous blood was collected by a senior lab technician using vacutainers. Blood was kept in a dark cool place until it was transported to a hospital where refrigerators were available. Analysis of serum retinol was performed in South Africa using HPLC. The data were entered in SPSS/DE and analysed in SPSS/PC statistical software.

## Results

As indicated in Table 1, of the 4123 preschool children clinically examined in the three woredas, namely Angacha (WIBS), Kedida Gamela (EPI-plus), and Kacha Bira (control), only eight (.2%) had bitot's spot. No cases of corneal xerosis, keratomalacia, and corneal scar were observed. Information obtained from mothers indicated that 51(1.2%) of the preschool children had night blindness. The prevalence of bitot's spot and night blindness appeared to be higher in the WIBS

Table 1: Prevalence of xerophthalmia in pre-school children, by study woredas, in Angecha (WIBS) Kadida Gamela (EPI-plus), and Kacha Birra (Control)

Clinical signs	Weredas			
	WIBS	EPI-plus	Control	Total
Night blindness	36(0.9)	8(0.2)	7(0.2)	51(1.2)
Bitot's spot	4(0.3)	2(0.1)	2(0.2)	8(0.2)
Xerosis	0(0.0)	0(0.0)	0(0.0)	0(0.0)
Keratomalacia	0(0.0)	0(0.0)	0(0.0)	0(0.0)
Corneal scar	0(0.0)	0(0.0)	0(0.0)	0(0.0)

Total examined	1512	1443	1168	4123
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Table 2: Prevalence of xerophthalmia among preschool age children, by age and sex

Signs	Sex	Age (months)						Total
		<12	12-23	24-35	36-47	48-59	60-71	
Night blindness	M	0	2	2	5	9	13	31
	F	2	4	3	6	0	5	20
Bitot's spot	M	0	0	0	1	1	3	5
	F	0	2	0	0	1	0	3
Total examined	M	199	270	345	402	358	481	2055
	F	207	282	368	384	335	492	2068

Wereda compared to the EPI-plus and control woredas.

Prevalence of xerophthalmia by age and sex breakdown is presented in Table 2. Bitot's spot was more common in males (5 cases) than in females (3 cases). The peak prevalence of xerophthalmia was observed among males in the age group of 60 to 71 months. Night blindness was also more prevalent in male children (31) than in females (20).

Table 3: Distribution of serum retinol among children, by Wereda

Serum retinol $\mu\text{mol}/1$	WIBS No. (%)	Woredas EPI plus No.(%)	Control No.(%)	All No. (%)
<0.35	4(6)	4(6)	1(1.6)	9(4.6)
0.35 $\leq$ 0.70	12(17.9)	21(31.3)	13(20.6)	49(23.4)
>0.70	51(76)	42(62.7)	49(77.8)	142(72.0)
Total examined	67	67	63	197

Table 3 shows that, out of 197 preschool children in the three woredas, 4.6% had serum retinol values below 0.35  $\mu\text{mol}/1$  while 27.9% exhibited serum retinol levels below or equal to 0.70  $\mu\text{mol}/1$ . The proportion of children with serum retinol levels of less than 0.35  $\mu\text{mol}/1$  was higher in the WIBS and EPI-plus woredas (6%) compared to the control wereda (1.6%).

From among those with serum retinol levels below 0.35  $\mu\text{mol}/1$ , four were males and five females. Serum retinol levels were equal to or less than 0.70  $\mu\text{mol}/1$  in 30.5% of the males and 27.9% of the females. The highest percentage of children with low serum retinol was noted among males in the 36-59 months age group (Table 4).

Table 4: Distribution of serum retinol values among preschool children, by age and sex, in three woredas of KAT Zone

Serum retinol $\mu\text{mol}/1$	Age (years)					
	Sex	<12	12-35	36-59	60-71	Total
<0.35	M	0	0	4	0	4
	F	0	0	1	2	5
0.35-0.70	M	0	3	11	14	28
	F	0	3	11	4	17
>0.7	M	0	11	34	28	73
	F	1	10	23	30	64
Total examined		1	28	84	78	191

\*Age was missing for the six children

## Discussion

The overall prevalence of bitot's spot observed in the three woredas in KAT Zone of the Southern People's Regional Administration (SNNPR) was below the values suggested by WHO for public health significance (8). Similarly, the prevalence observed in this region is relatively lower when compared to the high prevalence rates recorded in Tigray and Harari Regions (5). Although this also concurs with the findings of earlier studies (5,6) which showed very low prevalence of Bitot's spots or corneal lesions in the ensete staple zone as compared to the relatively high prevalence in the cropping and pastoral zones of the country, the relatively higher prevalence than previously recorded is indicative of the increasing trend of VAD in the area. This increasing trend becomes more apparent when the prevalence of night blindness and serum retinol levels are considered. The prevalence of night blindness (1.2%), which is an early indication of VAD, is greater than the WHO cut-off point of 1% (8). This is also similar to the proportion found in Tigray Region. The proportion of children who had serum retinol values of less than  $0.35 \mu\text{mol/l}$  (deficient) was 4.6% which was nearly equal to the WHO criteria of public health significance (5%). The prevalence as determined by serum retinol level of less than or equal to  $0.70 \mu\text{mol/l}$  (low) was 27.9%. This rate, based on WHO cut-off point of 20%, is an indication of the existence of severe sub-clinical VAD in the area (8).

More males were clinically or sub-clinically deficient than females in the area. The higher proportion of males than females with all clinical parameters of xerophthalmia and sub-clinical parameters is similar to previous observations in other parts of the country (7). This may be related to sex differences in feeding and care which reduces the opportunity of males to share vitamin A rich foods at home since male children usually stay out looking after cattle.

The deficiency condition prevails more among older children which is in agreement with an earlier study in other regions in the country (7). This is contrary to the general age pattern of VAD which is believed to increase between six months and three years of age during which complementary foods and later the family diet, represents a large proportion of the child's diet. These foods often do not contain enough vitamin A that adequately substitute vitamin A supplied from breast milk. The possible explanation that can be forwarded for the present observation was the extended period of breast feeding by rural Ethiopian women up to the age of three years or more which provided retinol in a readily absorbable form.

The previous relatively lower prevalence of xerophthalmia in the Ensete Zone was credited to the high consumption of green leafy vegetables, particularly Kale, Cheese and some times butter which are consumed along with Enset. But with the rapidly increasing population in the area and cattle rearing becoming more difficult, the favourable situation that existed previously is most unlikely to continue. A study conducted by Ghirotti in SNNPR reported that in Ethiopia farmers, as a result of population expansion, are being forced to cultivate large areas of crops at the expense of pasture for livestock which has resulted in increased child malnutrition (9). The results thus observed appear to justify this assertions. Some indications about the factors attributable to the increasing trend of VAD in the area may be derived from further in-depth analysis of the available data of this survey.

In conclusion, the results of this survey clearly indicate that VAD is emerging as serious problem in the area. Based on these results, it is readily evident that the interventions which are underway in the area should be strengthened and intensified in order to improve the deteriorating situation in the area.

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