Vitamin A deficiency in children under 6 months

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Introduction

Children at highest risk of going blind because of vitamin A deficiency were considered to be those weaned on to solids deficient in vitamin A and who have had an acute increased vitamin A demand due to measles, diarrhoeas, or respiratory infection. Vitamin A deficiency under 6 months is unusual, because newborns have good store of the vitamin, and breast milk contains sufficient quantity. The World Health Organization (WHO) recommends that children at risk of xerophthalmia receive 100,000 IU of vitamin A with measles vaccine at 9 months of age and subsequently, 200,000 IU, every 6 months, up to 6 years of age. We performed this retrospective analysis of hospital data after it was noticed that there was an unusual increase in the numbers of cases of blinding keratomalacia, in infants less than 6 months of age.

Methods

Records of children with vitamin A deficiency, seen in the hospital over a 9-month period from May 2002 to April 2003 were analysed. Those with acute blinding vitamin A deficiency were studied to evaluate the correlates of the disease. The age of the child, feeding practices, concurrent infection, and the nature and severity of vitamin A deficiency were noted.

Results

Table 1 shows the details of the seven children with corneal xerosis or keratomalacia. Of these, five were children aged 6 months or less. The mean age of the group was 7.57 months, and the median and mode were 4 months (range 2–24 months). In only one (10 months old) was the typical pattern of vitamin A deficiency following measles infection seen. All were born at term except one. Three had bilateral keratomalacia, and another had keratomalacia in one eye and xerosis in the other. None of the infants were breastfed. They were fed dilute, fresh cows milk.

Discussion

In this small sample of children with blinding keratomalacia, 70% cases were aged less than 6 months. This age group is not considered to be at risk for vitamin A deficiency. The National Programme for Prevention of Blindness recommends vitamin A supplementation starting at 9 months of age. This intervention would have been too late for the majority of babies in our study.

West has reported that maternal vitamin A deficiency is a public health problem in developing countries. Basu et al. have suggested a mega dose of 209 μmol of retinol be given to mothers at birth and exclusive breastfeeding as means of combating vitamin A deficiency in infancy. The WHO recommends that women receive 10,000 IU daily or 25,000 IU weekly while pregnant, and 200,000 IU after delivery.

All this assumes that the baby is breastfed. None of the children in our group was breastfed, and this presents a special challenge. This finding is similar to that of Rahmathullah et al. who observed that 12 of 15 children under 1 year of age with keratomalacia reported by him were not breastfed at all. Bahl et al. suggest vitamin A

Table 1  Details of the babies

<table>
<thead>
<tr>
<th>Serial number</th>
<th>Age in months</th>
<th>Dietary practices</th>
<th>Manifestation of Vitamin A deficiency</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>6</td>
<td>Top fed, dilute cows milk</td>
<td>Right corneal xerosis, left keratomalacia</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>Top fed, dilute cows milk</td>
<td>Bilateral keratomalacia</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>4</td>
<td>Top fed, dilute cows milk</td>
<td>Right keratomalacia</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>24</td>
<td>On solid foods</td>
<td>Right keratomalacia</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>10</td>
<td>Weaning started</td>
<td>Corneal xerosis</td>
<td>Measles</td>
</tr>
<tr>
<td>6</td>
<td>4</td>
<td>Top fed, dilute cows milk</td>
<td>Bilateral keratomalacia</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>3</td>
<td>Top fed, dilute cows milk</td>
<td>Bilateral keratomalacia</td>
<td>Low birth weight baby</td>
</tr>
</tbody>
</table>
supplementation of lactating mothers and of infants at the
time of diphtheria-pertussis-tetanus (DPT) and oral polio
immunization. This multicentre randomized, double-
blind, placebo-controlled trial was conducted in Ghana,
India and Peru. Mothers received 60 mg of retinol
palmitate at 18–42 days postpartum, and infants received
7.5 mg three times at 6, 10 and 14 weeks. Mother who
received the supplement had higher vitamin A in breast
milk at 2 months, and less infants were deficient than
controls at 6 months. The benefits of this programme were
greater in the Indian cohort studied. Supplementation
had no effect at 9 months and the authors suggest
additional strategies to improve vitamin A status of 6- to
9-month-old infants. It would appear that a strategy of
vitamin supplementation of non-breastfed children must
follow the pattern of this study and provide supplements
at 6, 10 and 12 weeks.

Ours was a hospital-based study and, from this, it is not
possible to estimate the problem in the community. The
usual age at presentation, however, indicates a change
in the pattern of the disease, in the community. We need
to address the needs of this vulnerable group if we are to
meet the Vision 20/20 by 2020.

Sara Varughese FRCS
Dr Shroff’s Charity Eye Hospital, Kedarnath Road,
Daryaganj, Delhi 110002, India
Correspondence to: Dr Sara Varughese
Email: puliyel@vsnil.com

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immunization alters breast milk retinol and infant vitamin A

Qualitative comparison of qualitative buffy coat
and light microscopy in malaria diagnosis

The diagnosis of malaria usually presents a serious
challenge to laboratories in most countries, especially in
underdeveloped and developing countries where malaria
infection is increasing rapidly.

The accepted laboratory practice for the diagnosis of
malaria is the preparation and microscopic examination
of blood film stained with Giemsa, Wright, or Fields
stain. Various rapid, simple, sensitive, and cost-effective
diagnostic techniques have been developed to overcome
the difficulties encountered in using light microscopy, to
reduce morbidity and mortality especially in children and
pregnant patients in most endemic areas.

The qualitative buffy coat (QBC) technique combines
an Acridine Orange (AO)-coated capillary tube and an
internal float to separate the layer of white blood
corpuscles (WBC) and platelets, using centrifugation.
Other methods have been claimed to be more sensitive
and specific in detection of malaria parasites, than light
microscopy.

A total of 270 patients of various ages presenting with
clinical symptoms of malaria were examined using QBC
and light microscopy. Blood samples were collected
asceptically through finger pricking onto clean glass slides
for preparation of thin and thick blood films (hereafter,
referred to as thick and thin film microscopy (TFM)).

Blood from the antecubital blood veins was collected
into a container containing ethylenediaminetetraacetate
(EDTA) through vacutainer for easy collection of large
volume of blood and to reduce the risk of contamination.
Films were examined microscopically after staining with
Giemsa and Field’s stains, for the presence of malaria
parasites. The TFM was considered the ‘Gold Standard’
for positive results.

For the QBC technique, properly mixed blood was
drawn up in the capillary tube provided to a predeter-
mined level indicated by a blue line on the tube. The tube
containing a pre-coated AO stain and potassium oxalate
was filled with venous blood, and an anticoagulant, which
contains a float, was inserted. The tube was centrifuged at
12,000 rpm for 5 min. Components of the buffer coat were
separated based on their density due to which they form
conspicuous bands.

After centrifugation, the QBC capillary tube was placed
on a paraview microscope and examined using a standard
light fluorescent microscope equipped with paralens UV
microscope adaptor. Fluorescing parasites were observed
and identified by the presence of green fluorescent dots at
the red blood corpuscles (RBC)/WBC interphase. The
results obtained with the TFM were then compared with
those of QBC technique, since the TFM method has
long been accepted as the Gold Standard for the diagnosis
of malaria.

Table 1 shows the percentage distribution of blood
samples that were positive and negative using QBC and
TFM: 181 (67.0%) were positive for malaria parasite with
QBC, whereas 174 (64.4%) were detected to contain
malaria parasite using TFM; 89 (33.0%) and 96 (35.6%)
gave negative results for QBC and TFM, respectively.

Table 2 shows a high sensitivity of 92.53% and
specificity of 79.0%. The positive and negative predictive
values were 88.7% and 85.61%, respectively. These
figures are inadequate to quantify the suitability of QBC
technique. The sensitivity and specificity value of 92.5%
and 79.0% can be attributed to the number of samples
studied.

Out of the 174 samples that were positive for malaria
parasite, 151 (83.4%) and 148 (85.1%) were identified as
Plasmodium falciparum species through QBC and TFM,

Table 1 Percentage distribution of number positive and negative
using QBC and TFM

<table>
<thead>
<tr>
<th>Method</th>
<th>Number positive (%)</th>
<th>Number negative (%)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>QBC</td>
<td>181 (67.0)</td>
<td>89 (33.0)</td>
<td>270</td>
</tr>
<tr>
<td>TFM</td>
<td>174 (64.4)</td>
<td>96 (35.6)</td>
<td>270</td>
</tr>
</tbody>
</table>