



ORIGINAL RESEARCH PAPER

Ophthalmology

A CROSS SECTIONAL STUDY ON THE PREVALENCE OF VITAMIN A DEFICIENCY

KEY WORDS: Vitamin A deficiency, Prevalence, Xerophthalmia, Bitot's spots

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ABSTRACT

Background: Vitamin A is an essential nutrient needed for normal vision, immune functions, maintenance of epithelial cell integrity, growth and development, reproductive function. It is the most important cause of preventable childhood blindness in developing countries. **Aim:** To estimate the prevalence of vitamin A deficiency in children ≤15 years reporting to a tertiary care centre **Materials & Methods:** A cross sectional study was conducted on 100 children aged upto 15years reporting to eye OPD from April 2022- June 2022. Detailed history from mother was collected. A comprehensive ophthalmic examination including visual acuity measurement, anterior segment, fundus evaluation was done. Vitamin A deficiency was clinically assessed by using WHO classification of Xerophthalmia. **Results:** The prevalence of clinical vitamin A deficiency in this study was 9%. Maximum presentation was seen in age group of >2-5 years. **Conclusion:** Prevention, early recognition by regular screening and nutritional education would decrease the risk of developing clinical vitamin A deficiency.

INTRODUCTION:

Vitamin A is an essential nutrient needed for normal vision and immune functions, maintenance of epithelial cell integrity, growth and development, reproductive function. Deficiency can lead to ophthalmological, dermatological and immune impairment. It is the most important cause of preventable childhood blindness in developing countries. Vitamin A deficiency associated ocular symptoms develop at retinol concentration less than 10microgram/Dl¹.

Ophthalmic manifestations of vitamin A deficiency include night blindness due to rod photoreceptor dysfunction. As there is progression, epithelium gets keratinized with formation of bitot spots, wrinkling of conjunctiva, conjunctival xerosis. Corneal changes include punctate keratopathy, corneal xerosis and ulceration. The corneal stroma liquefies leading to descematocele or perforation^{2,3}. Rarely, it causes focal retinal pigment epithelial defects resulting in xerophthalmic fundus³.

AIM:

Primary Objective:

1. To estimate the prevalence of vitamin A deficiency in children ≤15 years reporting to a tertiary care centre.

Secondary Objectives:

1. To analyse the ocular findings of vitamin A deficiency.
2. Analysis of various risk factors of vitamin A deficiency.

MATERIALS & METHODS:

Study design:

A cross sectional study was conducted on 100 children aged upto 15years reporting to a tertiary care centre from April 2022- June 2022.

Inclusion criteria:

1. Children of age ≤15 years
2. Parents willingness to participate.

Exclusion Criteria:

1. Children of age more than 15 years
2. Parents not willing to participate

Methodology:

Detailed history from mother including socioeconomic status, birth order, dietary intake of Vitamin A rich food, immunization status of child, history of illness like malaria, diarrhea, vomiting, measles, liver disorder, worm infestation were obtained. A comprehensive ophthalmic examination including visual acuity measurement, anterior segment, fundus evaluation was done. Vitamin A deficiency was clinically assessed by using WHO classification of Xerophthalmia.

WHO Classification of Xerophthalmia⁴:

- XN: night blindness
- X1A: conjunctival xerosis
- X1B: Bitot spots
- X2: Corneal xerosis
- X3A: Corneal ulceration/ keratomalacia <1/3 corneal surface
- X3B: Corneal ulceration/ keratomalacia >1/3 corneal surface
- XS: Corneal scarring
- XF: Xerophthalmic fundus

RESULTS:

Total 100 children who underwent screening in this study, out of which 54 were boys and 46 were girls. 14 belonged to less than 1 year, 9 were >1 year-2 year, 20 were >2 year- 5 year, 38 were >5year-10 year and 19 were >10year-15 years.

9 children were found to have vitamin A deficiency signs as per WHO classification. The prevalence of clinical vitamin A deficiency in this study was 9%. Gender wise, 5 boys and 4 girls had vitamin A deficiency, which showed slight male predominance.

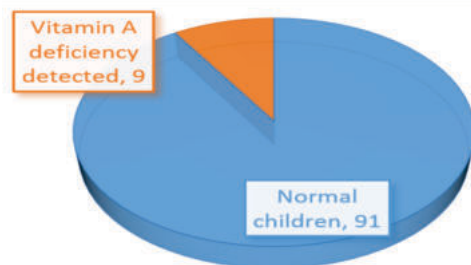


Figure 1: Prevalence of Vitamin A deficiency

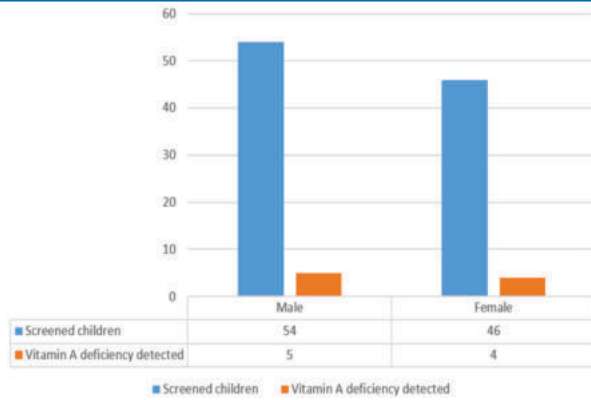


Figure 2: Gender distribution

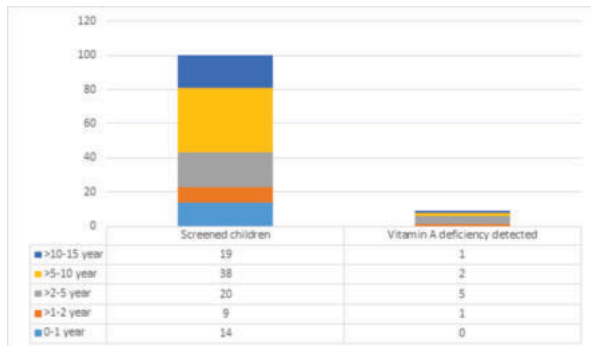


Figure 3: Age distribution

Maximum of 5 children were diagnosed in age group of >2-5 years.

Table 1: Ocular manifestation of vitamin A deficiency detected

| Ocular manifestations of Vitamin A deficiency | >1-2 years | >2-5 years | >5-10 years | >10-15 years | Total (n=9) |
|---|------------|------------|-------------|--------------|-------------|
| Night blindness (XN) | | 1 | | | 1 |
| Conjunctival xerosis(X1A) | 1 | 1 | 1 | 1 | 4 |
| Bitot spot (X1B) | | 2 | 1 | | 3 |
| Corneal Xerosis (X2) | | 1 | | | 1 |

Conjunctival xerosis was the common ocular sign of vitamin A deficiency in this study.

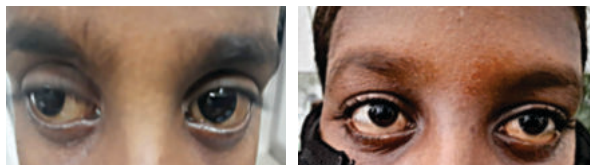


Figure 4: 4A- conjunctival xerosis , 4B- bitot spots on both eyes

Table 2: Analysis of risk factors

| Variables | Vitamin A deficient children (n=9) | Total children (n=100) | Percentage |
|--|------------------------------------|------------------------|------------|
| Type of family | | | |
| Nuclear family | 6 | 52 | 11.54% |
| Joint family | 3 | 48 | 6.25% |
| Socio economic status (Modified Kuppusamy Scale) | | | |
| Class II | 1 | 12 | 8.33% |

| | | | |
|--|---|-----|--------|
| Class III | 4 | 44 | 9.09% |
| Class IV | 2 | 28 | 7.14% |
| Class V | 2 | 16 | 12.5% |
| Immunization status | | | |
| Immunized | 9 | 100 | 9% |
| Partially immunized | 0 | 0 | - |
| Vitamin A enriched food intake | | | |
| Present | 6 | 78 | 7.69% |
| Absent | 3 | 22 | 13.64% |
| Hook worm infestation | | | |
| Present | 4 | 19 | 21.05% |
| Absent | 5 | 81 | 6.17% |
| Illness (diarrhoea, vomiting, measles, liver disorder) | | | |
| Present | 1 | 13 | 7.69% |
| Absent | 8 | 87 | 9.19% |

Vitamin A deficiency was detected more in children from nuclear family, reduced intake of vitamin A enriched foods, low socioeconomic status (class V), children with hookworm infestation.

DISCUSSION:

The prevalence of clinical vitamin A deficiency in this study was 9%. Previous studies had shown vitamin A deficiency ranging from 0.2-15%⁵. A study was carried out in the pre-school children of 5-15yrs in Ahmedabad where the prevalence of Vitamin A deficiency was found to be 2.9%. Cross sectional survey with multi stage sampling of Baroda, Ahmedabad and Rajkot in Gujarat state showed 6.30% to 13.5% prevalence in the same age group. Studies done on school children in other parts of the country showed prevalence of xerophthalmia ranging from 1.8% to 10.6%⁶. Higher prevalence has been reported in states like Haryana(58.8%) and Rajasthan(71.7%)⁷.

Gender wise, 5 boys and 4 girls had vitamin A deficiency, which showed slight male predominance. Studies on gender are controversial. This observation was correlated with Ethiopian study contributed by Tarik Kassaaye et al⁸. Chauhan et al and Bhattacharya et al^{9,10} observed that vitamin A. It was common among the age group of 2-5 children.

Poor dietary intake of vitamin A foods is a common cause of vitamin A deficiency. Dietary deficiency of vitamin A leads to development of xerophthalmia in those children taking insufficient green leafy vegetables. This was also observed by Tarik Kassaaye et al⁸ and Faruk Ahmed et al. This study also showed similar results.

Vitamin A deficiency was common in class V socioeconomic status. This is consistent with the reports of Chauhan et al⁹ and Pal et al. Hookworm infections cause development of anemia and hypoalbuminemia. Low serum retinol was most strongly associated with anemia in study done by ML Dreyfuss et al¹¹. In our study, vitamin A deficiency was common in hook worm infested children.

Limitations:

This study is conducted in a tertiary care hospital, so results would not be generalizable to the general population limiting its external validity. Since this is a cross sectional study, casual inference could not be made out.

CONCLUSION:

This study concludes that presence of ocular manifestation of vitamin A deficiency was observed more in children with low socioeconomic study, inadequate intake of vitamin A rich foods, hookworm infestation and children from nuclear family. Prevention, early recognition, adequate treatment by regular screening and nutritional education would decrease the risk of developing clinical vitamin A deficiency. The nutrition programme requires a multisectoral approach for addressing the needs of macronutrient deficiencies.

Conflicts of interest:

There is no conflicts of interest.

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