

## ORIGINAL ARTICLE

# VITAMIN A DEFICIENCY AMONG SCHOOL CHILDREN OF BAREILLY: CRUCIAL ROLE OF NUTRITION EDUCATION

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## ABSTRACT

**Objectives:** To find out the prevalence of VAD among urban school children of District Bareilly, to identify the associated biosocial factors and to suggest the suitable measures to prevent xerophthalmia among them.

**Methods:** Six month cross sectional study was conducted among school going children in 2 purposively selected schools in an urban area of Bareilly District. A structured proforma was used to collect the information. Chi-square test was used to analyze data.

**Results:** Of the 800 children examined, the overall prevalence of VAD was found to be 6.37%. The prevalence of VAD was highest in 11-12 years of age group children and lowest in the 3-5 years age group (P-value >.05). The prevalence of VAD was slightly higher among boys as compared to girls (P-value >.05). The prevalence of VAD was significantly higher among the children belonging to lower socioeconomic class as compared to those belonging to upper and middle socioeconomic class (P-value >.05). Nearly 48.5% of children were found to be underweight while 12.25% were overweight. Nearly a quarter of children were found to be anemic.

**Conclusion:** Nutrition education regarding regular intake of plant foods rich in carotene such as green leafy vegetables, yellow fruits, carrots and animal foods containing retinol like fish liver oil, fish, liver, egg, meat, milk, butter, cheese, and use of fortified food like vanaspati, margarine, dried skimmed milk should be strengthened.

**Key words:** Vitamin A deficiency, urban slum, school children

## INTRODUCTION

Vitamin A deficiency disorders (VADD) exists as a public health nutrition problem among preschool-aged children in 118 developing countries worldwide, with the South-East Asian Region harboring the maximum number of cases <sup>1</sup>. VADD early in life include all active clinical stages of xerophthalmia including corneal xerophthalmia and its potentially blinding sequelae, impaired mechanisms of host resistance, increased severity of infection, anemia, poor growth and mortality <sup>2</sup>. VADD has long been identified as a serious and preventable nutritional disease. It also contributes significantly, even at sub-clinical levels, to morbidity and mortality from common childhood infection. Studies suggest that ill health and risk of death from some infection are also increased even in children who are not clinically deficient but, whose vitamin A body store is depleted <sup>3-4</sup>. Though one of the main causes of xerophthalmia is poor intake of vitamin A rich foods, it is also associated with poverty, ignorance, faulty

feeding habits among the entire population but young children in particular <sup>5</sup>.

Lack of basic amenities like safe drinking water, proper housing, drainage and excreta disposal make the urban slum population more vulnerable to infection which further compromise the nutrition of those living in the slums <sup>6</sup>. VADD can occur at any age however very few studies on VAD have also included school children apart from preschool children. With this background the study was undertaken amongst school going children aged between 3-12 years in an urban area of Bareilly district to find out the prevalence of VAD, to identify the associated biosocial factors and to suggest the suitable measures to prevent xerophthalmia among them.

## MATERIAL & METHODS

A six month cross sectional study was conducted among school going children in an urban area of

Bareilly District. Ethical committee approval was taken before the start of the study. Two schools were selected purposively and informed consent from the school principal and teachers was obtained. A total of 350 children aged between 3-12 years studying in the selected schools were surveyed. A structured proforma was used to collect sociodemographic information and anthropometric and ocular examination by the authors themselves.

Socio-economic status of the subject was calculated as per the modified kuppuswamy socio-economic scale. Education, occupation and income of both the father and mother were taken in order to calculate the socio economic status of the child.

Weight of the children was taken with the help of weighing scale. Weight was measured to the nearest 0.1 Kg and Salter weighing machine (Model no. 235651) was used for weight measurement.

Height was measured against a non stretchable tape fixed to a vertical wall, with the participant standing on a firm/level surface and it was measured to the nearest 0.5 cm. The children were dressed in light underclothing and without any shoes during the measurement. Each measurement was done twice, and the mean of the two readings was recorded. If any pair of readings exceeded the maximum allowable difference for a given variable (e.g. weight, 100 g; length/height, 7 mm), the measurements were repeated. The same measuring equipments were used throughout the study.

Ocular examination was conducted by an ophthalmologist by a bright illuminant torch in natural light as per WHO guidelines. Vitamin A deficiency was diagnosed by the presence of bitot's spot and conjunctival xerosis<sup>7</sup>. Anaemia was diagnosed from by pallor of the conjunctiva.

Data entry and statistical analysis were performed using the SPSS windows version 14.0 software. Test of significance (Pearson's Chi- square test) was applied to find out the association. p values <0.05 were considered significant.

## RESULTS

Of the 800 children examined, 51 (6.37%) had clinical signs of xerophthalmia. The overall prevalence of VAD was found to be 6.37%. Most of them exhibited conjunctival xerosis and one had bitot's spot. None had any corneal xerosis, corneal scar and Keratomalacia.

The prevalence of VAD was highest in 11-12 years of age group children and lowest in the 3-5 years age group, the difference being statistically insignificant (P-value >.05) (Table 1).

The prevalence of VAD was significantly higher among the children belonging to lower socioeconomic class as compared to those belonging to upper and middle socioeconomic class. (P-value <.05). (Table 3)

**Table 1 - Prevalence of VAD in various age groups of the children**

Age (yrs)	No. of children examined	VAD (%)
3 & <5	156	7 (4.48)
>5 & <7	133	9 (6.76)
>7 & <9	163	11(6.70)
>9 & <11	169	11(6.50)
>11 & <12	179	13(7.26)
Total	800	51 (6.37)

Chi-Square(df) 1.25(4), P-value = 0.871

The prevalence of VAD was slightly higher among boys (7.02%) as compared to girls (5.68%), the difference being statistically insignificant (P-value >.05). (Table 2)

**Table 2: Prevalence of VAD according to the sex of the child**

Sex	No. of children examined	VAD (%)
Boys	413	29(7.02)
Girls	387	22 (5.68)
Total	800	51(6.37)

Chi-Square(df) 0.0598(1), P-value = 0.4392

A higher proportion (48.5%) of children was found to be underweight while 12.25% were overweight. Nearly a quarter of children were found to be anemic (Table 4)

**Table 3 – Prevalence of VAD in children according to the socio economic status (as per Modified Kuppuswamy socioeconomic scale)**

Socioeconomic status	No. of children examined	VAD (%)
Upper	29	0(0.0)
Upper middle	72	1 (1.3)
Lower middle	339	12 (3.5)
Upper lower	253	25 (9.8)
Lower	107	13 (12.14)
Total	800	51 (6.37%)

Chi-Square(df) 17.06(4), P-value\*= 0.001

\*Applying Yates correction

**Table 4 – Distribution of Children according to the Body Mass Index and Anaemia**

Body mass index	No. (N=800)	Percentage
Low (<18.5)	388	48.50
Normal (18.5-25)	314	39.25
Overweight (>25)	98	12.25
Anaemia	No.	(%)
Present	195	24.37
Absent	605	75.63

## DISCUSSION

The overall prevalence of VAD was found to be 6.37% in our study which is higher than that (2.9%) reported by Chauhan et al (2011)<sup>6</sup>. Higher prevalence (9.1%) was reported among school Children in Aligarh by

Sachdeva et al<sup>8</sup>. Surveys conducted in various countries of South-eastern Asia have shown VAD ranging from 0.2 % to 15 % in school aged children<sup>8</sup>. A rising trend in the prevalence of xerophthalmia was observed with the increase in age. Similar trends have been reported by Sachdeva et al<sup>8</sup>. A prevalence of 34% was reported among school attending adolescents in Nigeria<sup>10</sup>. This could be attributed to the low intake of Vitamin A rich foods such as dark green leafy vegetables/yellowish fruits in the higher age groups. Green leafy vegetables are also good sources of carotene, folic acid, vitamin C, iron and calcium contributing to overall improvement in nutritional status of children. Children aged upto 5 years are given Vitamin A supplementation in our country so VAD is less common in the initial 3-4 years of life. The prevalence of VAD was slightly higher among boys as compared to girls but the difference was not statistically significant. Similar trends have been reported by Chauhan et al and Bhattacharya et al<sup>6, 11</sup>.

The prevalence of VAD was higher among the children belonging to lower socioeconomic class as compared to those belonging to upper and middle socioeconomic class. Similar observation was found in the study done by Pal R et al<sup>12</sup>. This could be attributed to the fact that children from poor socioeconomic status live in unsanitary surroundings have poor access to basic health care and unhealthy dietary pattern contributing to poor nutritional status.

A higher proportion (48.5%) of children was found to be underweight while 11.7% were overweight. Previous studies reported a high prevalence of under nutrition among rural school children and children in urban slums.<sup>13-15</sup>

Nearly a quarter of children were found to be anemic. Anemia prevalence among children of school-going age is 37.7%<sup>16</sup>.

Government of India, in 1970, initiated National Prophylaxis Program against Nutritional Blindness to combat and prevent VAD. The program involves supplementation with massive dose of vitamin A as a direct strategy and nutrition education as an indirect long term strategy to combat VAD. After more than three decades of operation, the program however suffers from poor compliance. Lack of awareness in the community about the program is one of the possible factors for poor compliance<sup>17</sup>. Low awareness of eye diseases in an urban population in southern India was observed<sup>18</sup>.

Nutrition education regarding regular intake of plant foods rich in carotene such as green leafy vegetables, yellow fruits, carrots and animal foods containing retinol like fish liver oil, fish, liver, egg, meat, milk, butter, cheese, and use of fortified food like vanaspati, margarine, dried skimmed milk should be strengthened. Other measures like promotion of breast feeding, supply of safe drinking water, maintaining proper sanitation and hygiene, prevention of diarrhea, measles, acute respiratory infections and access to basic health services should also be adopted.

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