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## Prevalence of vitamin A deficiency among school going children aged 6-12 years

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**Abstract**

The present study was conducted to find out the prevalence of vitamin A deficiency (VAD) among school going children aged 6 – 12 years and to assess the nutritional status of these selected school going children. Information was collected using a structured performa. Out of the 30 children examined, the overall prevalence of VAD was found to be 43.33%. The prevalence of VAD was highest in > 10 and ≤ 12 years of age group children and lowest in the 6 and ≤ years age group. The prevalence of VAD was slightly higher among girls as compared to boys. 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. Nearly 56.7% of children were found to be underweight while 13.3% were overweight. In order to overcome the relentless vitamin A deficiency problem in the community, regular intake of plant foods rich in carotene such as carrots, green leafy vegetables, yellow fruits, animal foods like cod liver oil, lamb liver, fish liver oil, fortified food like margarine should be highly encouraged through nutrition education.

**Keywords:** Vitamin A deficiency, School-going children, Nightblindness, Nutritional status, Plant foods, Nutrition education

**Introduction**

Panear Vitamin A is a fat-soluble vitamin essential for normal vision, for maintaining the integrity of epithelial tissues, growth, and development and for a wide variety of metabolic functions (WHO, 2009; Arimond and Ruel, 2002) <sup>[12, 13]</sup>. Considerable amount of vitamin A can be stored in the liver and made available for use as the need arises. One of the earliest manifestations of Vitamin A deficiency is nightblindness and more severe deficiencies include ocular changes leading to blindness, particularly in young children. Vitamin A deficiency has long been recognized as a serious and widespread yet preventable nutritional deficiency in the world. Vitamin A boosts the immunity (Health Dialogue, 1999) <sup>[8]</sup> as it keep the membranes (surfaces) of the mouth, gut, respiratory tract and eye lids wet and healthy. Healthy membranes help to prevent germs entering the body and Vitamin A is needed for antibody production to fight against infection, thus Vitamin A has therapeutic potential as immune modulator. Recent data indicates that mortality rates are increased among children with Vitamin A deficiency and improvement in Vitamin A status can reduce mortality from childhood infections by 20-30% (Desai *et al.* 1977) <sup>[9]</sup>.

VAD is the result of two primary factors. The first is a persistent low intake of vitamin A inadequate to satisfy physiological needs. The second factor is a high frequency of infection. Infection depresses appetite and prompts an elevation in the body's vitamin A utilization, leading to inefficient conservation of the nutrient (WHO, Vitamin A deficiency, Advocacy). VAD also occurs when body stores are depleted at times of high requirement - such as during pregnancy and lactation, and phases of rapid growth (WHO, Vitamin A deficiency, Advocacy). Other conditions related to poverty, e.g. low social status (particularly affecting women), inadequate environmental sanitation, and insufficient water supply for drinking, growing food and maintaining adequate personal hygiene are generally associated with malnutrition, often including VAD (WHO, 199)]. Non-breastfed infants and children between the ages of 6-59 months experience more serious effects of VAD than any other groups besides pregnant and lactating women who are the most vulnerable groups at high risk of VAD (WHO, Vitamin A deficiency, Advocacy).

The earliest evidence of vitamin A deficiency is impaired dark adaptation or night blindness. Mild vitamin A deficiency may result in changes in the conjunctiva called Bitot's spots.

Severe or prolonged vitamin A deficiency causes a condition called xerophthalmia, characterized by changes in the cells of the cornea (clear covering of the eye) that ultimately result in corneal ulcers, scarring, and blindness (Semba, 2001; Brody, 1999). Vitamin A deficiency can be considered a nutritionally acquired immunodeficiency disease (Semba, 1997). Even children who are only mildly deficient in vitamin A have a higher incidence of respiratory disease and diarrhea, as well as a higher rate of mortality from infectious diseases, compared to children who consume sufficient vitamin A (Field, 2002). In fact, the strongest association between vitamin A and infection is found with diarrhea, especially when it is persistent, chronic, or severe. In countries where immunization programs are not widespread and vitamin A deficiency is common, millions of children die each year from complications of infectious diseases such as pneumonia and measles (Stephens, 1996). When vitamin A stores are inadequate, cells lining the lung lose their ability to remove disease-causing microorganisms. This may contribute to the pneumonia associated with vitamin A deficiency (Ross, 1999; Semba, 1998; Ross, 1998). It has been confirmed that improving the vitamin A status of deficient children significantly reduces the risk of mortality from measles by 50 %, from diarrhea by 40 %, and overall mortality by 25–35 % (WHO, 1997). Vitamin A is available in green leafy vegetables like drum stick leaves, yellow coloured fruits, papaya and in milk but it is not available to children because of ignorance, lack of awareness and ethnic problems.

Children in the school-going age group (6-16 years) represent 25% of the population in the developing countries (Gupta *et al.* 2009) [6]. They offer significantly descriptive material for these studies as they fall best in the preventable blindness age group and are easily accessible and schools are the best places for imparting health education to the children. Schools are also one of the best centers for effectively implementing the comprehensive eye healthcare program. VADD can occur at any age however very few studies on VAD have also included school children apart from preschool children (Chauhan *et al.* 2011). Finger millet flour, pearl millet flour and drumstick leaves were found to be good source of calcium, iron, vitamin C and total phenolic content. The developed products have improved nutrient contents and could be helpful for providing variety in the daily dietaries in addition to their nutritional benefits (Gupta *et al.* 2017) [42]. Therefore, the elimination of VAD is considered a key element for improving the survival, well-being, growth, and development of children, and thus, research showing the burden and determinants of VAD is of paramount importance. Thus, the present study was carried out to assess the prevalence of Vitamin A deficiency among school going children aged 6 – 12 years of East Mahewa Agricultural Institute, Naini, Allahabad.

## Materials and Methods

**Study area and sample selection:** The study was conducted among school going children in East Mahewa Agricultural Institute, Naini, Allahabad district. A total of 30 children aged between 6–12 years were surveyed. A structured proforma was used to collect sociodemographic information and anthropometric and ocular examination by the authors themselves.

**Socio-demographic profile:** A structured interview schedule was used to collect socio-demographic information like name, age, gender, socio-economic status of family etc. 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.

**Anthropometric Assessment:** Weight of children was taken with the help of Suvarna electronic digital personal weighing scale (Model: Electro). Height was measured against a non-stretchable tape fixed to a vertical wall, with the participant standing on a level surface. The children were dressed light underclothing and without shoes during measurements. 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 equipment were used throughout the study.

**Clinical Assessment:** Respondents were examined for clinical signs and symptoms of vitamin A deficiency (Srilakshmi, 2012) [25]. 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 (WHO, 1982) [32].

Data entry and statistical analysis were performed using the SPSS windows version 14.0 software.

## Results and Discussion

Out of the 30 children examined, the overall prevalence of VAD was found to be 43.33%. 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 > 10 & ≤ 12 years of age group children and lowest in the 6 & ≤ 8 years age group, as shown in Table 1.

The prevalence of VAD was slightly higher among girls (47.36%) as compared to boys (36.36%), as shown in Table 2. 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, Table 3.

A higher proportion (56.7%) of children was found to be underweight while 13.3% were overweight. Previous studies reported a high prevalence of under nutrition among rural school children and children in urban slums (WHO, 2000; Sachdev, 2003; Bhargava *et al.* 2004) [29, 34, 30, 35, 31, 36]. As shown in Table 4.

**Table 1:** Prevalence of VAD in various age groups of children.

Age (years)	No. of children examined	VAD (%)
6 & ≤ 8	4	1 (25.0)
> 8 & ≤ 10	9	4 (44.44)
> 10 & ≤ 12	17	8 (47.05)
Total	30	13 (43.33)

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

Gender	No. of children examined	VAD (%)
Boys	11	4 (36.36)
Girls	19	9 (47.36)
Total	30	13 (43.33)

**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	2	0 (0.0)
Middle	9	4 (44.44)
Lower	19	9 (47.36)
Total	30	13 (43.33)

**Table 4:** Distribution of Children according to the Body Mass Index

Body mass index	No. (N=30)	Percentage
Underweight (<18.5)	17	56.7
Normal (18.5-25)	9	30
Overweight (>25)	4	13.3
Total	30	100

## Discussion

The overall prevalence of VAD was found to be 43.33% in our study, which is much higher than that (6.37%) reported by Swati and Esam, (2012) [38]. A prevalence of 34% was reported among school attending adolescents in Nigeria (Ene-Obong *et al.* 2001) [37]. 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.

The prevalence of VAD was slightly higher among girls (43.33%) as compared to boys (36.36%) but the difference was not statistically significant. Similar trends have been reported by Kumari Richa *et al.* (2018) [28]. Satish *et al.* (2014) reported that 95 (5.93 %) children are suffering from Vitamin A deficiency out of which males were 66 (69.48 %) and females were 29 (30.52%). The present finding is also in contrast with that of Merchant *et al.* (1975) [39] who reported that Prevalence of Vitamin A deficiency was observed more in male children than females.

Higher prevalence of VAD was seen among the children belonging to lower socioeconomic class as compared to those belonging to middle and upper socioeconomic class. This is in line with the study done by Pal (2009) [33]. Satish *et al.* (2014) also revealed that signs of Vitamin A deficiency were found to be more in children of 6 years age. Vitamin A deficiency was observed more in Socio economically poor status like in Class V (64.21%) and IV (33.68%) while not a single child found to have Vitamin A deficiency in Class I and II. 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. 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 al.* (2001) [40] and Faruk Ahmed *et al.* (2005) [41].

More than half (56.7%) of children was found to be underweight while 13.3% were overweight. Previous studies reported a high prevalence of under nutrition among rural school children and children in urban slums (WHO, 2000; Sachdev, 2003; Bhargava *et al.* 2004) [29, 34, 30, 35, 31, 36].

## Conclusion

To combat the persistent vitamin A deficiency in the community, particularly among school children, 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 margarine, dried skimmed milk should be strongly encouraged. Maintaining proper sanitation and hygiene, safe drinking water supply, and access to basic health services can also play a very vital role. It is important to educate the community about the important morbidity in school age children, their etiology and prevention. Provision of rich food in vitamin A must be supplied regularly in Mid-Day Meal. Increase awareness of school children and parents about importance of taking dark green leafy vegetables, yellow fruits and dairy products by respective Public Health people in the district. Identify high risk children who are prone to develop vitamin A deficiency and intervene with appropriate strategy to prevent xerophthalmia amongst those children. If space is available than school kitchen garden should be made, So that children can take message to their home to develop kitchen garden.

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