RESEARCH ARTICLE

PREVALENCE AND DETERMINANTS OF XEROPHTHALMIA IN RURAL CHILDREN

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ABSTRACT

Background: Vitamin A deficiency (VAD) is recognized as a major cause of blindness among children in India.
Aims & Objective: The study was planned to find out prevalence Of VAD in rural children.
Material and Methods: This cross sectional study was undertaken amongst children (0-15 years) in a rural area selected by simple random sampling out of villages under a Primary Health Centre. Out of 844 children 802 participated in study. WHO classification of xerophthalmia was adopted in study to find out prevalence.
Results: Overall prevalence of xerophthalmia was 5.4 %. Only the milder manifestations of xerophthalmia viz. night blindness and Bitot's spots were observed. Not a single case of active corneal involvement was seen. Prevalence of Bitot's spots was 0.9 % in children under 6 years of age and 3.3 % in children above 6 years of age. Prevalence of xerophthalmia was significantly more in older children. Higher prevalence (Not significant) was observed in males, lower socioeconomic status as well as in large family. Overall prevalence of anaemia was found 11.8 % in study population. Significantly high prevalence of xerophthalmia (Odds ratio 5.7) was observed in children suffering from anaemia.
Conclusion: Presence of milder manifestation of xerophthalmia and 0.9 % prevalence of Bitot's spots in children under 6 years of age in present study shows declining trend of VAD (but still a public health problem since prevalence is more than 0.5 %) and 3.3 % prevalence in children above 6 years of age shows that apart from strengthening of Vitamin A prophylaxis programme to increase coverage, health education is needed for dietary diversification to include vegetables and fruits in the diet for long-term sustainability in improving vitamin A status of children of all age group.

KEY-WORDS: Prevalence; Rural Children; Xerophthalmia

Introduction

Vitamin A is needed in small amounts by humans for the normal functioning of the visual system and maintenance of epithelial cellular integrity. Vitamin A deficiency (VAD) can occur at any age however, it is a disabling and potentially fatal for children under 6 years of age.[1] The prevalence of Bitot's spots may be highest in school age group but their occurrence may reflect past more than current history of VAD.[2] Studies have shown that VAD causes not only blindness but it also has a profound impact on general morbidity, mortality and growth.[3] VAD is regarded as a public health problem if the prevalence of Bitot's spots amongst under 6 years children is 0.5% or more.[4] Vitamin A prophylaxis programme was started in India in 1970 with the aim of preventing blindness due to vitamin A deficiency. The most comprehensive and recent data shows that only 30% children had received a dose of vitamin A.[5] The prevalence of Bitot's spots (based on NNMB pooled data of seven states) was 1.8, 0.7 and 0.7 respectively, during the surveys carried out in 1975-79, 1988-90 and 1996-97. Individual studies carried out between 1950 to date revealed that the prevalence of vitamin A deficiency was 4% during the period up to 1980. There are a couple of studies on adolescents done in south India, which indicate vitamin A deficiency as 0.8% to 1%.[6] Very few studied on VAD have included school children apart from preschool children. To estimate prevalence of VAD in children in all age group present study was undertaken amongst children 0-15 years in a rural area with emphasis laid on biosocial factors.

Materials and Methods

The present cross-sectional study was undertaken in a rural area of Bareilly (UP). Villages were selected by simple random sampling out of

villages under a PHC. The study population comprised all children 0-15 years residing in rural area i.e. 844. Out of these, 42 could not be included because of various reasons; hence 802 children formed the study subjects. A house-to-house survey was carried out and information was obtained as per a predesigned proforma. Parents were inquired about night blindness. The history was accepted only when the response was definite and positive. The standard methods and procedures for ophthalmic examination were used to detect xerophthalmia.[1] Ocular examination was done with the help of a bright illuminated torch in natural light by doctors. WHO classification of xerophthalmia was adopted in the study. WHO report has stated that conjunctival xerosis (X1A) is not recommended for community diagnosis.[1] Because of these recommendations, conjunctival xerosis (X1A) only when accompanied by Bitot's spots (X1B) has been included in the positive clinical signs of xerophthalmia in the data presented here. The socioeconomic status of the study subjects was estimated as per modified Kuppuswamy Socioeconomic scale.[7] Haemoglobin estimation of all children was carried out and cut off point of 11 g/dl for children under 6 years and 12 g/dl for children above 6 years was considered for diagnosis of anaemia.[8] Children suffering from xerophthalmia was given 200,000 IU of Vitamin A orally for 2 days. Statistical analysis was carried out by chi-square test and odds ratio with its 95% confidence interval.

Results

Table 1 describes the prevalence of xerophthalmia according to age. Overall prevalence of xerophthalmia was found to be 5.4%. Only the milder manifestations of xerophthalmia viz. night blindness and Bitot's spots were observed. Not a single case of active corneal involvement was seen. The prevalence of xerophthalmia was found to increase with increasing age, reaching its maximum at 13-15 year age group (11.6%). Increasing trend with increasing age was followed by all manifestations of xerophthalmia. Though the prevalence of xerophthalmia is 5.4%, the over-all prevalence of signs and symptoms was 4.4% as 08 study subjects had more than one sign/symptom. Prevalence of Bitot's spots was 0.9 % in children under 6 years of age and 3.3% in children above 6 years of age. Increase in prevalence of xerophthalmia with increase in age group was found statistically significant.

Table 2 describes the prevalence of xerophthalmia according to socio-demographic factors. Higher prevalence of xerophthalmia was observed in boys, lower socioeconomic status and children with family size of 5 and above, however difference was not found significant.

Table-1: Age and Sex Distribution

Age-group (years)	Study Subjects	Only Night Blindness (XN only)	Only Bitot's Spots (XIB only)	Both XN and XIB	Total Number with Xerophthalmia
0 - 3	154	0(0)	1(0.6)	0(0)	1(0.6)
4 - 6	170	2(1.2)	2(1.2)	1(0.5)	5(2.9)
7 - 9	182	3(1.6)	3(1.6)	1(0.5)	7(3.8)
10 - 12	158	5(3.2)	6(3.8)	3(1.9)	14(8.9)
13 - 15	138	6 (4.3)	7 (5.1)	3 (2.2)	16 (11.6)
Total	802	16 (2.0)	19 (2.4)	8 (1.0)	43 (5.4)

Figures in parenthesis are percentages; X^2 =23.9 ; Df = 4 ; P = 0.00 (Highly Significant)

Table-2: Prevalence of xerophthalmia according to socio-demographic factors

Factor		Study Subjects	Xerophthalmia	P value
Gender	Male	445	27 (6.1)	0.98
	Female	357	16 (4.5)	
Socioeconomic Status	Middle	275	11 (4.0)	1.53
	Lower	527	32 (6.1)	
Family Size	≤ 5	425	21 (4.9)	0.31
	> 5	377	22 (5.8)	

Figures in parenthesis are percentages

Table-3: Distribution of Xerophthalmia with Anaemia

Anaemia	With Xerophthalmia	Without Xerophthalmia	Total
With Anaemia	17 (17.9)	78 (82.1)	95 (11.8)
Without Anaemia	26 (3.7)	681 (96.3)	707 (88.2)
Total	43 (5.4)	759 (94.6)	802 (100.0)

Figures in parenthesis are percentages; X^2 = 30.6; P = 0.00 (Highly significant); Odds Ratio = 5.71; 95% Confidence interval for Odds ratio = 2.8 – 11.5

Overall prevalence of anaemia was found 11.8% in study population. High prevalence of xerophthalmia was observed in children suffering from anaemia (Table 3). Estimates of odds ratios and their 95% confidence intervals confirmed significant association between xerophthalmia and anaemia.

Discussion

Vitamin A deficiency is recognized as a major cause of blindness and an important public health problem among children in India since long. Although many studies have been conducted to assess the prevalence of xerophthalmia in different parts of country but very few studies have included children of all age group. The current study observed 5.4% prevalence of xerophthalmia in children 0 – 15 years of age. The earlier-conducted studies have reported a prevalence of xerophthalmia in the range of 1.1% to 22.3% in different population groups and in different parts of the country.[9-16] The study[9], carried out in the rural area near Nagpur in central India, has estimated 16.8% prevalence of xerophthalmia, which is much higher than what we observed. Decrease in prevalence may be due to Vitamin A prophylaxis programme. Prevalence of Bitot's spots (0.9%) in children under 6 years of age in this study is closer to prevalence observed by NNMB (0.7% pooled data of seven states) in 1996-97 and shows that VAD prevalence has declined over the years but still it is a public health problem since prevalence is more than WHO guidelines (0.5% in preschool children).

Presence of milder manifestations of xerophthalmia shows that prevalence of VAD is on decline. In the present study, significantly higher prevalence of VAD was found in older age group. Similar findings[10,14] are also reported by other investigators. The observed association between various socio-demographic factors (lower socio-economic status and large family size) and xerophthalmia was also endorsed by the results of previous studies.[10,11] In the current study, the prevalence of xerophthalmia was found more in children suffering from anaemia. This may be because anaemia is associated with low intake of nutrients plus anaemia is generally associated with various infections which further precipitate or aggravate vitamin A deficiency.

Conclusion

Presence of milder manifestation of xerophthalmia and 0.9% prevalence of Bitot's spots in children under 6 years of age in present study shows declining trend of VAD (but still a public health problem) and 3.3% prevalence in children above 6 years of age shows that apart from strengthening Vitamin A prophylaxis programme which covers preschool children only, health education is needed for dietary diversification to include vegetables and fruits in the diet for long-term sustainability in improving vitamin A status of school children. Such an approach will improve intake of vitamin A and other micronutrients in a balanced manner.

References

1. Sommer A. Vitamin A deficiency and its consequences: a field guide to detection and control, 3rd ed. Geneva, World Health Organization, 1994.
2. Sommer A, Emran N, Tjakrasudjatma S. Clinical characteristics of vitamin A responsive and nonresponsive Bitot's spots. American Journal of Ophthalmology, 1980, 90:160–171.
3. Rahamathullaji L, Underwood BA, Thulasiraj RD. Reduced mortality among children in Southern India receiving a small weekly dose of vitamin A. New England Journal of Medicine 1990, 323: 929-35
4. World Health Organization. Indicators for Assessing Vitamin A Deficiency and their Application in Monitoring and Evaluation Intervention Programme. WHO, Geneva, 1996, pp 5-14.
5. Indian Institute of Population Sciences, Mumbai. National Family Health Survey II Data, 2000.
6. Singh P, Toteja G S. M Micronutrient Profile of Indian Children and Women: Summary of Available Data for Iron and Vitamin A . Indian Pediatrics 2003; 40:477-479
7. Mahajan BK, Gupta MC. Textbook of Preventive and Social Medicine. Jaypee Brothers. Medical publishers (P) Ltd., New Delhi, Second edition, 1995 : 134-5
8. K Park. Parks Textbook of Preventive and social medicine. 18th edition. Jabalpur: Banarsidas Bhanot. .2005:4 50.
9. Garg S, Nayar S, Garg A, Sane S. Vitamin A deficiency in preschool children. Indian Pediatrics 1984, 21 : 491-4
10. Sharma SK, Mathur GP, Mathur S, Singh YD. An epidemiological study of hypovitaminosis A in preschool children of urban slums in Gorakhpur. Indian Journal of Preventive and Social Medicine 1985, 16 (4) : 131-6

11. Katiyar GP, Jaiswal P, Reddy DCS, Agrawal KN. Biosocial determinants of xerophthalmia in under-five children. Indian Journal of Preventive and Social Medicine 1986, 17 (2) : 69-78
12. Kartha GP, Purohit CK. Prevalence of xerophthalmia – an evaluation in the context of ongoing National vitamin A supplementation programme in five villages of Dholka taluka of Ahmedabad district. Indian Journal of Community Medicine 1991, 16 (3) : 115-8
13. Sampathkumar V, Abel R. Xerophthalmia in rural South Indian children. Indian Pediatrics 1993, 30: 246-8.
14. Fakhir S, Srivastava I, Ahmad P, Husan SS. Prevalence of xerophthalmia in preschool children in an urban slum. Indian Pediatrics 1993, 30 : 668-70
15. Chamani N, Sharma P, Meena N, Sharma U. Pattern of vitamin deficiencies among the malnourished preschool children in ICDS blocks of Jaipur city. Indian Journal of Maternal and child Health. 1994, 5 (4) : 109-11
16. Pal R, Sagar V. Antecedent risk factors of xerophthalmia among Indian rural preschool children. Eye Contact Lens. 2008 ;34(2):106-8.

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