Prevalence of Xerophthalmia in Pre-school Children in an Urban Slum

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Vitamin A deficiency is a serious public health problem in many developing countries with xerophthalmia being the most important cause of childhood blindness. Xerophthalmia reportedly affects 5 million Asian children(1) and causes total or partial blindness among 160,000-185,000 Indian children(2). Vitamin A deficiency also has important effects on systemic health and survival; recent work in Indonesia indicates the high risk of death in children with even mild deficiency(3). The present study was undertaken to find out the prevalence rate of xerophthalmia and also certain host and environmental factors in its epidemiology in an urban slum.

Material and Methods

This study in an urban slum (total population 9000) of Aligarh (India) between May 1988 and May 1989, was conducted by door to door survey by postgraduates and included 498 children (294 boys, 204 girls) in the age group of 0-5 years. Eyes were examined in natural light, as well as with lens and torch, and eye signs classified according to WHO criteria(4). Nutritional status was classified as per the Indian Academy of Pediatrics criteria(5). Statistical analysis was done using χ^2 test.

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Results

Most inhabitants of the area were backward Muslims employed in lock work, with very poor literacy status; only 1-2% had studied beyond VIII class. Average per capita income was Rs. 80/- per month. According to the Kuppuswamy scale of social status(6), families belonging to upper middle, lower middle, upper lower and lower groups were 5.2, 48.2, 42.2 and 4.4% respectively.

Xerophthalmia was found in 50 of the 498 under-five children, giving a prevalence rate of 10% (*Table I*), with no significant difference ($p>0.05$) in the prevalence rate of males and females. The commonest feature of vitamin A deficiency was night blindness (XN : 3.6%) followed by conjunctival xerosis (X_1A : 2.8%) and Bitot spots (X_1B : 2.4%). Six out of 12 cases with Bitot Spots had conjunctival xerosis as well, but the actual prevalence was calculated from the 14 cases who had isolated conjunctival xerosis. Other cases had only one ocular sign: corneal xerosis (X_2) in 0.4%, corneal ulceration (X_3A and X_3B) in 0.2% each and corneal scars (XS) in 0.4%. Ten of 14 cases with X_1A were diagnosed clinically, the remaining detected only with the Rose Bengal test. Similarly, 2/12 cases with Bitot spots were diagnosed with the help of the Kajal test. Children below one year of age did not have any manifestation of xerophthalmia, the maximum prevalence being observed in the 3-4 year age group (18.3%) followed by 14.3% in the

TABLE I—*Prevalence of Various Manifestations of Xerophthalmia*

Age group	N	XN	XIA	XIB	X2	X3A	X3B	XS	Total
0 - 1	115	-	-	-	-	-	-	-	Nil
1 - 2	56	-	-	1 (1.8)	-	-	1 (1.8)	-	2 (3.6)
2 - 3	69	-	2 (2.9)	2 (2.9)	2 (2.9)	-	-	1 (1.5)	7 (10.1)
3 - 4	104	1 (0.96)	9 (8.7)	8 (7.7)	-	1 (0.96)	-	-	19 (18.3)
4 - 5	154	17 (11.0)	3 (1.9)	1 (0.6)	-	-	-	1 (0.6)	22 (14.3)
Total	498	18(3.6)	14(2.8)	12(2.4)	2(0.4)	1(0.2)	1(0.2)	2(0.4)	50(10.04)

Figures in parentheses are percentages.

Table II —*Distribution of Xerophthalmic Children According to Severity of Malnutrition*

Severity of malnutrition	No. and %of children with xerophthalmia	No. of children without of any evidence of xerophthalmia	Total
Mild (Grade I and II)	36(20)	141	177
Severe (Grade III and IV)	12(38)	19	31
Total	48(23)	160	208

$\chi^2 = 5: p < 0.05$

4-5 year group. Night blindness was most prevalent in the age group of 4-5 years (11%). Conjunctival signs (X_1A and X_1B) also were more common in children over 3 years than in those under 3 (8.1 *vs* 2.1% <0.05). Corneal signs were present in 0.8% of children above 3 years compared to 1.7% below 3 years of age. Statistical significance could not determined because of the small number of cases.

Of 498 children examined, 208 were malnourished, 48 of whom (23%) had xerophthalmia as compared to only 2/286 (0.8%) nutritionally normal children. While 96% (48/50) children with xerophthalmia were malnourished, only 4% (2/50) had xerophthalmia in nutritionally normal group : this difference was statistically significant ($p<0.05$). While 38% children with xerophthalmia were severely malnourished (Grades III and IV), in the group of children with mild malnutrition (Grade I and II), only 20% had xerophthalmia (*Table II*). The prevalence of xerophthalmia in severely malnourished children was significantly higher than in cases of mild malnutrition ($p<0.05$).

Discussion

Vitamin A deficiency mainly affects preschool children and is reliably indicated by ocular manifestations(7). The reported prevalence of xerophthalmia has ranged between 2.6-30% in different parts of this

country(8-10); we found it to be 10%. The higher prevalence in the 3-5 years age group has been reported earlier also(9-10) and is probably due to poor availability of vitamin A in diet because of poverty and ignorance, coupled with impaired vitamin A metabolism because of the high incidence of diarrheal and respiratory diseases and worm infestations.

The prevalence of various manifestations of xerophthalmia far exceeded the prevalence criteria set by WHO for determining the public health significance of xerophthalmia(4), making it a significant public health problem in the area surveyed.

While 96% of xerophthalmic children were malnourished, 77% of all malnourished children had no apparent evidence of xerophthalmia. Thus, malnutrition is not always associated with xerophthalmia; perhaps repeated respiratory and intestinal infections and worm infestations aggravate or precipitate vitamin A deficiency when stores are marginal.

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Maternal Beliefs Regarding Diet During Acute Diarrhea

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The modern management of acute diarrheal illness emphasizes oral rehydration and early feedings(1). Such simple

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