Childhood blindness in India: a population based perspective

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Aim: To estimate the prevalence and causes of blindness in children in the southern Indian state of Andhra Pradesh.

Methods: These data were obtained as part of two population based studies in which 6935 children ≤15 years of age participated. Blindness was defined as presenting distance visual acuity <6/60 in the better eye.

Results: The prevalence of childhood blindness was 0.17% (95% confidence interval 0.09 to 0.30). Treatable refractive error caused 33.3% of the blindness, followed by 16.6% due to preventable causes [8.3% each due to vitamin A deficiency and amblyopia after cataract surgery]. The major causes of the remaining blindness included congenital eye anomalies (16.7%) and retinal degeneration (16.7%).

Conclusion: In the context of Vision 2020, the priorities for action to reduce childhood blindness in India are refractive error, cataract related amblyopia, and corneal diseases.
residing in the two poor rural districts. In two of these five children, visual acuity could not be measured. These two children, both aged 3 years, were thought to have very poor vision, as they could not fixate and follow light. Table 1 shows the causes of blindness in children from APEDS. Refractive error included a case each of high myopia and hyperopia. Corneal opacity in one child was present since birth, the cause of which could not determined. One child with congenital eye anomaly had retinocochoroidal coloboma involving optic disc and macula. The cause of amblyopia in one child was stimulus deprivation because of congenital cataract (both eyes had been operated upon).

Seven of the 4074 children (7–15 years of age) examined in RESC were blind, a prevalence of 0.17% (95% CI 0.07 to 0.35). The age range of these blind children was 7–14 years, and six (85.7%) were female. The causes of blindness are shown in Table 1. Refractive error included a case each of high myopia and hyperopia. The retinal disorders included a case each of heredomacular degeneration and myopic degeneration. Corneal opacity in one child was following fever in early childhood that was thought to be related to precipitation of vitamin A deficiency based on the history given by the mother, and one child had stimulus deprivation amblyopia due to nystagmus.

Considering the two studies together, the prevalence of childhood blindness was 0.17% (95% CI 0.09 to 0.30). The prevalence of presenting visual acuity of <3/60 in the better eye was 0.10% (95% CI 0.04 to 0.21).

**DISCUSSION**

As the prevalence of blindness in children is much lower than in adults, a larger sample size of children is needed to provide accurate data on the prevalence and causes of childhood blindness. Hence, the majority of the population based data on childhood blindness are generally obtained from either surveys done to assess blindness for all ages or from surveys done to assess a particular disease of interest in children—for example, vitamin A deficiency or refractive error. These data on childhood blindness reported by us are also from two such studies: one from a study of visual impairment in all ages (APEDS) and the other from a study of refractive errors in school aged children (RESC). In the absence of other recent population based data on childhood blindness from India that include complete eye examination of all the study participants, these data could serve as an estimate of childhood blindness with presenting visual acuity of <6/60 in the better eye. Though every attempt was made by the field team to recruit blind children or children with multiple handicaps from the sample households who were away at special schools, it is possible that some of these children could have been missed if information about them was not given to the field team by their families for some reason. Hence, this could have resulted in lower estimates for childhood blindness.

A complete dilated eye examination was performed for children in both the studies. The causes of childhood blindness were generally similar in both the studies, except for the retinal causes that were found only in RESC. These data on causes of blindness should be interpreted in the background of the relatively small number of blind children. Considering both the studies together, refractive error, which can be easily treated with a study of eyes, was responsible for one third of the blindness. Congenital eye anomalies, retinal degeneration, and amblyopia due to congenital cataract and nystagmus made up 50% of the total blindness. Corneal disease was responsible for 17% of the blindness, half of which could be attributed to vitamin A deficiency.

The majority of the children with blindness were female in both the studies. The relatively small sample size has to be kept in mind while interpreting this finding. We have also previously reported that blindness is higher in females of all ages considered together in the Indian state of Andhra Pradesh. It is possible that families are less likely to enrol a female blind child in the blind school than males, and hence, we found more female blind children in this population. This is also suggested from the study on children living in blind schools in nine states of India, which reported that 60% of the children in these schools were males.

From an eye care service delivery and planning perspective, one third of the blindness was due to refractive error which is relatively easily treatable. Another 16.6% of the blindness was due to preventable causes (8.3% each due to vitamin A deficiency and amblyopia after cataract surgery). The remaining 50% of the blindness was due to causes that are currently not treatable or preventable, which included congenital eye anomalies (25%), retinal degeneration (16.7%), and nystagmus related amblyopia (8.3%). Extrapolation of these data suggest that of the approximately 400 million children in India, 680 000 (95% CI 360 000 to 1 200 000) may be blind, including 226 440 with easily treatable refractive error. The majority of the blind children are likely to be in the poor segment of the population. In the context of Vision 2020, these data suggest that the priorities for action to reduce childhood blindness in India appear to be refractive error, cataract related amblyopia, and corneal diseases.

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