ORIGINAL ARTICLE

Estimated Prevalence of Monocular Blindness and Monocular Severe Visual Impairment in Children of Cross Rivers State, Nigeria

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ABSTRACT

Aim: The aim was to report on the prevalence of monocular blindness/monocular severe visual impairment (MB/MSVI) in children found in Cross River State Nigeria, using the key informant method (KIM). **Settings and Design:** A cross-sectional study using the KIM. **Patients and Methodology:** Key informants were trained to identify children with vision problems through recognition of pictures of disease conditions, observation of behavior of the child and discussion with villagers during house to house visits, school visits, church visits, or market visits. They were instructed to bring the children to a predetermined health center for examination by a pediatric ophthalmologist led team. The children were examined, and findings recorded on the World Health Organization/prevention of blindness and low vision recording form for children. **Statistical Analysis Used:** Data were entered into MS Excel, transferred and analyzed with STATA 11. **Results:** Among 994 children with suspected visual impairment, 21.5% were diagnosed as MB/MSVI, with a population prevalence of 0.18/1000 children in the state. Males accounted for 61%. The leading anatomical causes were the cornea in 41%, the whole globe in 20%, and lens-related in 19%. Boys were 2.6 times (95% confidence interval: 1.4–4.7, $P = 0.002$) more likely to have trauma as an etiology compared with girls. **Conclusions:** Monocular blindness/monocular severe visual impairment children are essentially "one-eyed" children at risk of becoming blind individuals. The prevalence of MB/MSVI is 2.25 times that of bilateral blindness and severe visual impairment in children in this population. The main anatomical causes, as well as ocular trauma, are largely avoidable. Trauma that is avoidable was a significant etiology in boys compared with girls. MB/MSVI adds to the burden for child eye care services.

Keywords: Child eye care services, monocular blindness, monocular severe visual impairment, Nigeria, ocular trauma

INTRODUCTION

Childhood visual impairment surveys using the World Health Organization (WHO) definitions focus on bilateral blindness and severe visual impairment (SVI), which is based on visual acuity in the better eye. Thus, a child with monocular blindness/monocular SVI (MB/MSVI) and a normal other eye is regarded as a child with normal vision. However, children with only one normal eye lose functions such as stereopsis, visual fields, and possibly social security in addition to potential problems of cosmesis and the increased risk of bilateral blindness.[1,2] The impact of these losses on the overall function, psychology and well-being of a child is not well-understood, and a child with MB/MSVI will have many years to live with the condition.

The objective of this study was to determine the prevalence of MB and MSVI in children in this population.

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PATIENTS AND METHODOLOGY

The study was conducted in Cross River State (CRS) between March 2011 and June 2011.

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The methods used in this population-based study using key informants (KI) have been previously described.[3,4] Briefly, key members of communities who are nonmedical personnel, are trained to identify and refer all children believed not to see well in the community; the identified and referred children are then examined by a pediatric ophthalmologist led eye care team. In this way, a population-based estimate of the prevalence of visual impairment can be made. MB/MSVI was defined as present in a child with one eye with a presenting visual acuity of <6/60 and the other eye with normal vision, defined by WHO as visual acuity of 6/18 or better. As recommended by WHO, presenting acuity rather than best corrected was used as this reflects the reality that a child lives with and informs service delivery needs. The etiology of the vision loss was determined by asking caretakers, the child or from the examination.

Data from the WHO/prevention of blindness and low (PBL) examination record for children with blindness and low vision form was entered into MS Excel, transferred and analyzed with STATA 11.

The study adhered to the tenets of the Declaration of Helsinki and was approved by the Ethics Committee of the University of Calabar, Nigeria.

RESULTS

Nine hundred and 94 children were examined of whom 214 had MB/MSVI. We divided 214 by the estimated 1,160,000 (40% of 2.9 million) children under 16 years in CRS to get a prevalence of 0.18/1000 children.[3,4] The mean and median age of MB/MSVI children was 10.5 years. The major anatomical causes of MB/MBSVI are shown in Table 1.

The etiologies were unknown in 105 (49%) children with MB/MSVI; among the 109 (51%) children with MB/MSVI that had a known etiology, trauma was implicated in 76 (70%) children. Among these 76 (70%), the anatomic site was cornea in 32 (42%), lens in 21 (28%), whole globe in 20 (26%) and other in 3 (4%). Trauma was the etiology in 56/128 (44%) boys compared with 20/86 (23%) girls (odds ratios = 2.6, 95% confidence interval = 1.4–4.7, P = 0.002). Among the 16 (8%) children with monocular amblyopia eight were refractive in origin, five associated with strabismus, two with ptosis and one of unknown etiology.

Table 1: Major anatomical site of monocular blindness and monocular severe visual impairment in children

Anatomical cause	Total (%)
Corneal scar	89 (42)
Whole globe	43 (20)
Lens	42 (19)
Amblyopia	16 (8)
Retina	9 (4)
Optic nerve	6 (3)
Uvea	5 (2)
Refractive error	2 (1)
Others	2 (1)
Total	214 (100)

DISCUSSION

The prevalence of bilateral blindness and sever visual impairment in this population using the KI method was ascertained and reported in a previous study. From this study, the estimated prevalence of MB/MSVI in children in this population (0.18/1,000 children) using the same population and method is 2.25 times the prevalence of bilateral blindness/SVI (0.08/1000 children).[3,5] This ratio is higher than that reported in the population-based study of children in Karnataka, India (1.13/1.06 = 1.06).[6] The causes of MB in this Nigerian population are different too with the leading three in our study being corneal scar, the whole globe and lens related (cataract). While refractive amblyopia was the leading cause (responsible for 40% of the cases) in Karnataka, it was responsible for only 8 of the 16 cases of amblyopia in Nigerian children. Trauma as etiology was important in both populations. However, it was significantly more prevalent in boys compared to girls in our study. While prevention of trauma through behavioral changes and education is the ultimate goal, appropriate, timely intervention in children with injuries is critically important in determining the outcome.[7] A study in Tanzania indicated that the primary health care system was a factor in delaying both adults and children with severe ocular trauma from receiving appropriate care, hence we recommend a direct referral to a tertiary eye health center in circumstances of ocular trauma in children.[8]

Cataract was the third leading anatomic cause of MB/MSVI. In operating on cataract in children, good visual acuity and binocular function is often a challenge to attain because of delayed presentation and associated ocular co-morbidities including amblyopia.[9] Nonetheless, operating on monocular cataracts in older children from whatever etiology might be beneficial because of the uncertainty of when the lens became opaque and the benefit of a better cosmetic appearance.

It may be argued that, monocular vision is of less importance for public health policies for reducing

preventable/avoidable blindness. It may not hold true for the pediatric population who have a longer time to live with the monocular impairment. More so, it must be considered that a child with MB is at risk for bilateral blindness.[10] Therefore, such a child should be treated differently, and necessary precautions taken to preserve the vision in the eye with normal vision while attending to the eye with visual impairment and aggressively treating for amblyopia.

A limitation of the study is that of under-reporting of the prevalence; since children with normal vision in one eye and visual loss in the other eye may not show any behavioral or visual function limitations and the likelihood that some children were not identified by the KI. Therefore, the estimate must be interpreted as a minimum. Recall bias, especially regarding etiology is also recognized as a challenge. However, on the WHO/PBL eye examination record for children with blindness and SVI, trauma as an etiology is noted as being accurately recorded due to a fairly reliable history, confirmable by examination. Hence, the only valid etiology discussed was that of trauma in this study. Further research would help clarify the long-term visual and social outcomes of children with monocular vision loss; this may help draw more attention to the prevention, treatment, and/or rehabilitation of children with monocular vision loss in developing countries. MB/MSVI adds to the burden for child eye care services in Nigeria.

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