

Causes of severe visual impairment and blindness in the schools for the blind in the Northern and North Western Uganda

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Objective: To identify the major causes of severe visual impairment and blindness among children attending the schools for the blind with the view of offering treatment to those with remediable visual impairment and blindness.

Design: Cross sectional study.

Study site: Four schools for the blind in the districts of Gulu, Kitgum and Arua (Uganda).

Methods: Pupils in Gulu Primary (Gulu), St Thereza Girls (Kitgum), Ediofe Girls (Arua) and Mvara Boys (Arua) schools had complete ophthalmic examination from their respective schools. All findings were documented on the WHO standard forms for recording causes of SVI/ blindness in children. Consent was obtained from the school authority/ teachers.

Results: A total of 53 children were examined; Males 35 (66%) and females 18 (34%). The onset of visual loss among the children was as follows: at birth 16 (30%), Infancy 5 (10%), onset between 1-15 years 25 (47%) and unknown onset 7 (13%). Visual impairment was observed in 98% and categorized as: blind 39 (75%), severe visual impairment 10 (19%), low vision 3 (6%) and normal vision 1 (2%). Anatomically, the major sites of abnormality leading to visual loss were: whole Globe 27%, cornea 21%, lens 21%, optic nerve 13.4% and retina 9.6%. The etiology of conditions that led to visual loss was found to be as follows: unknown (63%), post natal causes (27%), hereditary (4%), peri-natal factors (4%) and intra uterine causes (2%). The criteria for admission in the school was as follows: those recommended and referred by health workers were 27 (51%), while 20 (38%) were taken by parents or guardians and 5 (11%) by the District Education Office.

Conclusion: Sixty seven percent of the causes of visual impairment were avoidable.

Key words: Uganda, SVI/Blindness, Schools for the blind.

INTRODUCTION

Visual Impairment (VI) is a major worldwide problem that has become a public health concern. It has a significant impact on the quality of life of the individual, the family, the community and the nation at large. The World Health Organization (WHO) definition of Severe Visual Impairment (SVI) is visual acuity of less than 6/60 but equal or greater than 3/60 (counting finger at 3 meters) in the better eye with best possible correction. Blindness (BL) is inability to count finger at 3 meters with best possible correction¹. *In terms of visual field blindness is visual field no greater than 10° around central fixation*¹. Functional blindness is when a person retains some minimal degree of vision but is unable to carry out / perform tasks for which eyesight is essential².

It is estimated that nearly 50 million people are blind according to the World Health Organization (WHO) criterion for blindness. An additional 135 million people are visually impaired and need social, vocational, economic or rehabilitative support services³. More than 90% of all the blind and visually impaired people live in the developing world where common causes of bilateral visual loss include cataract, glaucoma, trachoma, vitamin A deficiency and onchocerciasis³. Information on childhood blindness has been obtained through studies in the schools for the blind. According

to the WHO a child is an individual aged 15 years or less. Causes and magnitude of visual impairment in the schools of the blind vary from region to region in the world. In the developed countries SVI and blindness among children in the schools of the blind is mainly due to diseases of the retina, optic nerve, central nervous system and hereditary factors. The major causes in the developing countries are however avoidable, for example corneal scarring due to infection or malnutrition, cataract, trachoma, glaucoma etc. About 80% of causes of blindness in the developing countries are avoidable.

Causes of severe visual impairment / blindness and low vision can be classified according to the anatomical site of the lesion or etiology. Anatomical classification is according to the level at which vision is obstructed in the eye, for example, whole globe cornea, lens, uvea, retina and optic nerve. Etiological classification is according to the developmental time at which the insult occurred, that is, hereditary, intrauterine, perinatal childhood or unclassified⁴.

Surveys to assess the causes of blindness in the schools for the blind were conducted in most parts of Uganda including mid northern Uganda and West Nile except in the schools in Gulu region. Gulu region has been under prolonged war for the past 20 years. There was therefore need to document the causes of SVI/BL in these schools / region so as to build country wide

data base that will be useful in the interventions to address childhood blindness. Establishing the criterion for admission may help in the formulation of policy regarding admission.

The objective of the study was to identify the major causes of SVI / BL among students attending the schools for the blind with the view of offering treatment to those with remediable visual impairment / blindness. The specific objectives were to determine the anatomical site of abnormality leading to visual impairment, the etiology of visual loss, and the criteria for admission in the schools.

MATERIALS AND METHODS

This was a cross sectional study done in four Ugandan schools for the blind in the districts of Gulu, Kitgum and Arua. All the pupils aged 15 years or less and young adults (15-18 years) who became blind before the age of 15 years were enrolled and examined while all those who did not want to be examined and young adults or adults with SVI / blindness that developed after the age of 15 years were excluded in the study.

The study variables included characteristics such as name of school, age, sex, address, tribe, age of onset of visual loss, visual assessment, additional disability and history of previous eye surgery. Other variables were anatomical site of abnormality leading to visual loss, etiology of visual loss, and information on who referred admission in the school. The WHO standard form for recording SVI / BL in children was used.

Permission to conduct the study was obtained from the district and school administrations while individual consent for minors was obtained from the teachers/school matron and confidentiality was observed. Complete ophthalmic examination was done by Ophthalmologists and any available medical records of the children were reviewed. All findings were documented on the WHO standard forms for recording causes of SVI/ blindness in children and short closed ended questionnaire. The data collected was analysed using SPSS and the results presented in form of texts, tables, charts and graphs forms.

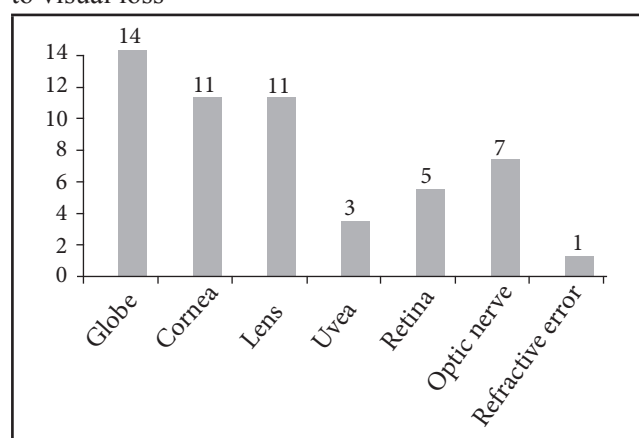
RESULTS

Demographic characteristics: A total of 53 respondents were examined in the four schools; 35(66%) males and 18(34%) females giving a male to female ratio of 2:1. The youngest subject was aged six years while the oldest was 18 years. Majority (86.8%) of the respondents were aged 5 - 15 years.

Visual loss: In the majority (48.1%) onset of visual loss was during childhood period (1-15 years) followed by at birth (30.8%), unknown onset (13.5%) and at infancy (9.6%). Family history of visual loss was reported by 40 (75.5%) while in six cases (11.3%) it was unknown and absent in 7(13.2%). History of consanguinity was negative in 14 (26.4%) and unknown in 39 (73.6%).

Category of visual impairment: Of the 53 respondents, 52 (98.1%) had visual impairment distributed as follows: Low vision (5.8%), SVI (19.2%) and blind (75%). SVI/BL was observed in 94.2%. The child with a normal vision had left eye phthisis bulbi secondary to trauma but a normal right eye and was studying in Braille. Figure 1 shows the major site of abnormality leading to visual loss among the respondents.

Figure 1: Major anatomical site of abnormality leading to visual loss



The abnormality of the globe includes the following phthisis bulbi, unsightly blind eyes, staphyloma micophthalmia and other globe congenital abnormalities.

Aetiology of visual loss: In the majority (63.5%) of respondents the underlying aetiology of causes of visual impairment was unknown. The main causes of visual impairment in these cases were congenital abnormalities (8), cataracts (6), glaucoma (4), optic atrophy (2) keratoconus (2), uveitis, and retinoblastoma amongst others. The respondent with retinoblastoma was an 11 year old male who had bilateral enucleation at 3 years. The postnatal / childhood causes of visual loss (26.9%) were corneal scars (4), measles (4), trauma (2), intraocular infection/inflammation (2) and others. One respondent had optic atrophy secondary to onchocerciasis. The other causes of visual loss were peri-natal disorders (3.8%), hereditary factors (3.8%) and Intra uterine factors (1.9%).

Table 1: Distribution of respondents by school and age (n=53)

Age (years)	Ediofe Girls	Mvara Demon	Gulu Primary	St Thereza Girls	Total (%)
>5 -10	2(4%)	4(8%)	7(13%)	5(9%)	18 (40)
>10-15	4(8%)	5(9%)	14(26.9%)	5(9%)	28 (52.8)
>15	1(2%)	2(4%)	4(8%)	0(0%)	7 (13.2)
Total	7(13%)	11(21%)	25(47%)	10(19%)	53 (100)

The most important perinatal / neonatal factor was ophthalmia neonatorum. The two hereditary diseases identified were retinitis pigmentosa and a case of congenital lens dislocation that had a positive familial history of similar diseases. The only intrauterine disease was suspected congenital toxoplasmosis.

In the seven cases aged above 15 years, the causes of visual impairment were due to cataract (3), advanced glaucoma (2) and optic nerve atrophy (2).

Avoidable and non avoidable causes of visual loss: Avoidable causes of visual impairment were observed in 35(67.3%) of cases while in 17(32.7%) the causes were non avoidable. The leading causes of avoidable visual loss / impairment were cataracts eight (23%), corneal scars seven (20%), glaucoma five (14.3%) and uveitis four (11.4%). The most important causes of non avoidable visual impairment were congenital abnormality 11 (64.7%), and optic atrophy of unknown cause four (23.5%).

Criteria of admission: Thirty one (58.5%) respondents were seen by the health workers before going to the school for admission while the remaining 22 (41.5%) were not. Of the 31 cases seen by health workers, 27 (51%) were recommended and referred to the school for the blind. Twenty (38%) children were taken direct to school by parents or guardians without referral from health units and 5 (11%) by others which included NGO's and the department of special needs education in the districts

Additional disability: Four (7.5%) of the 53 subjects had additional disability which comprises of mental retardation (3) and hearing loss (1). The remaining 49 (92.5%) did not have any additional disability.

DISCUSSION

Demography characteristics: In this study the majority (86.8%) of the respondents were aged 5 - 15 years. This is because this was a school based study. In Ethiopia Kello and Gilbert⁵ reported that 96.7% of the 360 respondents were aged below 16 years. In both cases the children in the schools for the blind are averagely older than their counter parts in the normal schools since they tend to delay to start school. Discussions with the heads of the blind annex revealed that some children are brought to the schools because the parents find keeping them at home a big burden to the family. There were more males (66%) than females (34%) and the reason for this could not be ascertained.

Onset of visual loss: In the majority (48.1%) onset of visual loss was during childhood period (1-15 years) followed by at birth (30.8%), unknown onset (13.5%) and at infancy (9.6%). The leading causes of visual loss in the childhood period are mainly avoidable causes of blindness such as intraocular infections, corneal scars, and glaucoma. Onset of visual loss at birth was mainly due to conditions such as congenital abnormality and congenital cataract while onset in the first year of

life was associated with corneal scars, cataracts and infections. All the seven cases aged above 15 years reported onset of visual loss before the age of 15.

Category of visual impairment: Of the 53 respondents, 52 (98.1%) had visual impairment and these were distributed as follows: Low vision (5.8%), SVI (19.2%) and blind (75%). SVI/BL was observed in 94.2%. In Ethiopia Kello and Gilbert⁵ found 94.5% with BL or SVI while in a multistage study in India⁶ SVI/BL was reported in 94.4% of the 1411 cases examined. Similar study on 165 children in Indonesia revealed that 96.3% were blind and 3% were SVI⁷. These findings were similar although this is a smaller sample size compared to the rest of the studies. There is therefore evidence to support that the majority of the children in the schools for the blind are the right category of children with visual impairment suggesting a good selection practices.

Anatomical site of visual impairment: The study shows the anatomical causes of visual impairment amongst the respondents were: Globe 26.9%, cornea 21.2%, lens 21.2%, optic nerve 13.5%, retina 9.6%, uvea 5.8% and refractive errors 1.9%. Kello and Gilbert⁵ reported cornea/ phthisis 62.4%, optic nerve 9.8%, cataract /aphakia 9.2% and uvea 8.8% while in Nigeria Ezegwui *et al*⁸ found lens 30.4%, cornea 21.7%, globe 17.4%, buphthalmos 10.9%. Rahi *et al* in India reported: corneal/globe 47.7%; retina 19.3% and lens 12.3%. Similar studies in Indonesia by Sitorus *et al*⁷ found: globe 32.7%, retina 26.0%, cornea (17.6%), lens (13.3%), optic nerve (6.1%), and uvea (4.3%). Tumwesigye⁹ examined 271 children in 14 schools in central, eastern and western Uganda and found retinal disorders 22%, optic nerve lesions 16%, glaucoma 5.3% refractive errors 3.3% and others 9.3% .

Aetiology of visual impairment: The aetiology of visual impairment was as follows: Unknown aetiology 63.5%; post natal/childhood 26.9%; perinatal factors, hereditary and intrauterine factors accounted for 3.8%, 3.8% and 1.9% respectively. Other studies showed that childhood / postnatal factors accounted for 49.8% and 38.6% in Ethiopia and Nigeria respectively while in Indonesia hereditary diseases and infective causes of blindness were the predominant causes of blindness, accounting for 42.4% and 29.7%, respectively^{5,7}. The results in the developing countries are similar and most of the causes of blindness could be avoidable. The result from Indonesia shows a mixed picture between developing and developed countries⁶ .

Causes of blindness: The avoidable causes of visual impairment accounted for 67% of all cases and these were due to cataracts 11 (31%), corneal scars 7(20%), glaucoma 3 (9%). The remaining 33% were non avoidable causes which were due to congenital defects 11 (33%), and optic atrophy of unknown aetiology 3(9%). Findings in Ethiopia and Nigeria showed that avoidable causes of blindness accounted for 68% and

74.5%, respectively, of all the students examined^{5,7}. These are close to the WHO report in which 80% of all causes of blindness are avoidable.

Though this study has a smaller sample, the findings are consistent with the reported patterns in the above developing countries. West Nile region (Arua) and Northern Uganda (Gulu) lacked established eye care service delivery with fully functional eye departments till the years 2003 and 2005 respectively when eye departments were built and ophthalmologists posted to the respective regions. Prior to these periods the regions were being served by visiting ophthalmologists through outreach services. Besides the Gulu region had been under a two decade war which also affected the delivery eye care services. These may partly explain the high causes of avoidable blindness in the two regions.

Criteria for admissions: Of the 53 respondents 27 (51%) were referred to the school for admission by eye health workers and 20 (38%) by parents / guardians. A small fraction 5 (11%) were referred by the district education offices for rehabilitation (special needs) and other Non Governmental Organizations. Four children were seen by eye health workers but not referred suggesting low level of concern about blind children education among some health workers.

CONCLUSIONS AND RECOMMENDATION

Ninety four point two percent of the respondents had SVI/Blindness. The commonest anatomical sites leading to visual impairment were the globe (14%) cornea, (11%) and lens (11%) while the aetiology of conditions that caused visual impairment was unknown in the majority (63.5%). Sixty seven percent of the causes of SVI / VI were avoidable. The practice of referring children to the schools for the blind by health workers is low (50%). It is therefore important to improve capacity to prevent childhood blindness and promote education of the blind children.

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