July 2007

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## Original Article

# Blindness in Children at the Ida Rieu School for the blind and deaf

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## Abstract

**Objective:** To identify the causes of blindness at the Ida Rieu school for the blind and deaf, Karachi, Pakistan.

**Methods:** A cross sectional study was conducted at the Ida Rieu School for the blind and deaf. The data collected from medical record of students was entered into the WHO/PBL eye examination form for children with blindness and low vision.

**Results:** Records of 144 pupils aged between 4-30 years were reviewed, including 67% males and 33% females. One third (31%) children had visual impairment (<6/18-6/60) and 69% were blind (<3/60-NPL). The commonest anatomical site was retina (41%) and whole globe (20%). The etiology was unknown in 49% cases. In 33% of cases, the data suggested hereditary cause as the etiology, 40% of cases were preventable and 13% treatable.

**Conclusion:** Avoidable causes of blindness were seen in 53% of children, 58% of which were preventable and19 were treatable (JPMA 57:334:2007).

## Introduction

Eye diseases which lead to blindness remain a highly prevalent and serious health problem in many developing countries. The control of blindness in children is a priority because it affects their development, education and employment opportunities. This has far-reaching impact on the quality of not only their lives but also that of their families. Another important concept associated with childhood blindness is 'years of blindness'.[1] Its significance is paramount when it comes to allocation of resources, as it can be argued that restoring the sight of one child from cataract is equivalent to restoring the sight of ten elderly adults from cataract.[2] Most of these children live in the under developed world, in Africa, Asia and Latin America, where economic deprivation is exacerbated by the added challenge of failing vision. Disabled people have lower education and income levels than the rest of the population.[3] And since most disabled children will become disabled adults, the consequence is alarming. Out of the presently estimated 45 million blind people only 3% are children, these figures might seem trivial. Since without intervention, the number of individuals with blindness might reach 76 million by 2020, resulting in an increased burden of childhood blindness. Thus highlighting the need to control blindness in children, so as to eliminate unnecessary blindness and promote good vision throughout the world.[4]

According to a population-based survey 1987-1990, conducted by the Ministry of Health of Pakistan and the World Health Organization (WHO), Pakistan has 1.78% a prevalence of blindness.[5] In Pakistan, so far there is no reported data available on prevalent causes of childhood blindness for any future recommendations. Thus necessitating the need for study in this area. Reliable prevalence data are difficult to obtain for a variety of reasons but the available evidence suggests that the prevalence varies from 0.3/1000 children in economically developed countries to over 1.0/1000 children in underdeveloped societies.[6] Almost half of all blindness in children particularly those in the poor countries is due to avoidable causes that are amenable to cost effective interventions.[7] Vitamin A deficiency, harmful treatment remedies, measles, congenital rubella, ophthalmia neonatorum are a few examples of avoidable blinding conditions seen in the developing world.[8] This study was undertaken to identify the causes of blindness in a school for blind and deaf children in Pakistan.

## Methods

A cross sectional study was conducted at the Ida Rieu School for the Deaf and Blind - named after Ida Augusta Rieu, wife of the then commissioner of Sindh, J.L. Rieu. It was set up in the 1920s and is presently providing education to over 700 students.

Medical records of students were reviewed from February to April 2004, after obtaining consent from the

school administration. The blind students at the Ida Rieu School were examined in the year 2002. Amongst these, students with onset of blindness before 15 years of age, with complete medical and ophthalmological records were included in the study.

The school keeps a personal record for each child, which includes medical and ophthalmological reports. All children attending school for the visually handicapped were seen by an ophthalmologist and results for eye examination which stated visual acuity, ophthalmic findings, category of visual impairment, recommended treatment, proposed mode of education and the need for training and mobility were reported. The visual acuity was measured using an illiterate Snellen E optotype. If the visual acuity was less than 3/60, each eye was tested for ability to perceive light. Refraction and low vision aid assessment, if indicated was preformed by a qualified optometrist. Visual loss was classified according to WHO categories of visual impairment9. Simple tests for functional vision were used. Anterior segment examination was performed using flash light and magnifying lens. Posterior segment examination was performed by indirect and direct ophthalmoscopy after mydriasis.

The WHO/PBL eye examination record for children with blindness and low vision form10 was used to analyze the available data. These forms have sections pertaining to demographic data, visual acuity, general medical conditions, past eye surgeries, anatomical site affected, suspected causes and present usage of low vision aids or spectacles.

Data collected was analyzed by the SPSS statistical software. A report of the findings and recommendations was given to the principal of the school.

## Results

Medical records of 162 students at the blind school were reviewed, out of which 144 were analyzed as they had complete information.

There were 96 male (66.6%) and 48 female (33.3%) children. The mean age was 12.94 years with a range of 4-30 years; 12 students (8.3%) were under 5 yrs of age, 28 (19.4%) were aged 5-10 years, 70 students (48.6%) were aged 10-15 years while 33 (22.9%) were older than 15 years.

There was a positive family history of another member in the family being affected in 62 cases (43.1%), and 57 of these blind children (39.6%) were born to parents with a consanguineous marriage.

The age at onset of visual loss was known for 111 students (77.1%) and 75 students (52.1% of the total) were known to be blind by birth. Amongst these 144 students, 5 children had mild visual impairment (3.4%), 13 had moderate visual impairment (9%), 27 had severe visual impairment (18.8%) and 99 were completely blind (68.8%).

**Table 1. Anatomical site for blindness and visual impairment (n=144).**

| Anatomical Site | n | % |
|---|---|---|
| Whole globe | 29 | 20.1 |
| Cornea | 9 | 6.3 |
| Lens | 26 | 18.1 |
| Uvea | 1 | 0.7 |
| Retina | 59 | 41 |
| Optic nerve | 13 | 9 |
| Other | 7 | 4.9 |

**Table 2. Reported causes of visual loss in the study population (n=144).**

| Causes of Visual Loss | n | % |
|---|---|---|
| Hereditary Disease | 47 | 32.6 |
| Intrauterine Factor | 6 | 4.2 |
| Perinatal/Neonatal Factor | 6 | 4.2 |
| Postnatal/Infancy/Childhood Factor | 14 | 9.7 |
| Cannot Determine (unknown aetiology) | 48 | 33.3 |
| Aetiology Not Documented | 23 | 15.9 |

**Table 3. Avoidable causes of blindness and visual impairment (n=77)**

| | n |
|---|---|
| **Preventable (n=58)** | |
| Vitamin A def/measles | 7 |
| TORCH/meningitis | 0 |
| Hereditary | 47 |
| Trauma/harmful traditional remedies | 4 |
| **Treatable (n=19)** | |
| Cataract | 13 |
| Glaucoma | 4 |
| Uveitis | 0 |
| ROP | 2 |

For all the students examined, 29 (20.1%) had whole globe lesions. Corneal lesions accounted for visual loss in 9 students (6.3%); 6 (66.6%) in children under 15 years and 3 (33.3%) in those over 15 years (Table 1).

Cataract (13, 9.0%) was a common cause of visual impairment/blindness - 9(69.2%) in children under 15 and 4 (30.8%) in children over 15. Uncorrected aphakia accounted for a further 9 (6.3% of all the students). In 2 cases of cataract, there was associated bilateral microphthalmos, 7students with cataract (53.8%) had visual acuity of less than 3/60.

Retinal dystrophy (45, 31.3%) was the single commonest cause of visual impairment/blindness; 25 (55.5%) in under 15 years and 20 (44.5%) in children above 15 years. Other retinal causes included albinism (1, 0.7%), retinopathy of prematurity (2, 1.4%) and retinoblastoma (1, 0.7%). Twelve students (8.3%) had optic atrophy, 7 (58.3%) were children below 15 years and 5 (41.7%) were older than 15 years.

Hereditary factors (32.6%) constituted the major aetiology of blindness, 25 of these children (17.4%) had the abnormality since birth with the exact aetiology unknown whereas in 23 records (15.9%) the aetiology was not documented at all (Table 2).

Avoidable causes of belindness were identified in 77 cases, 58 of which were preventable while 19 were treatable (Table 3). However, mild degree of overlapping was present amongst these preventable and treatable causes. Regarding need for therapeutic interventions, spectacles for refractive errors were recommended for 25 students (17.4%) and provision of low vision aid (LVA) (telescope or magnifier or both) for 36 (25%) students.

## Discussion

This study aimed at identifying the causes of blindness in a selected population of school-going children. On the one hand, children in schools for the blind may not be representative of the blind in the whole population[11] as it is believed that in most developing countries only about 10% of the children are in blind schools.[12] However, on the other hand, population-based surveys, although exhaustive, identify only a very small number of blind children, in whom it might be difficult to highlight the pattern of causes of blindness. Furthermore, in the poor countries it is estimated that 60-80% of blind children die within 1-2 years of becoming blind.[13]

Blind schools have the advantage of ease of examining a large number of children within a relatively short period of time by one examiner using standard methods; however, they are potentially biased.[11] Blind schools can be very expensive because of the services they offer, however, in our setting; Ida Rieu is a welfare school. Other biases include limited accessibility of services and knowledge of the existence of blind schools. Furthermore, cultural and social barriers, such as co-education, refrains parents from sending their children to these schools.

The results of the study showed that the number of male students examined were twice the number of female students (66.7% vs. 33.3%). This proportion may be representative of practices inherent in the society which encourage education in boys rather than in girls.

Coming to the results of the study, the retina was found to be the main anatomical site followed by the whole globe and the lens. Within the retinal group, retinal dystrophy was the leading cause of blindness. Such a pattern was also observed in a school-based study done in China.[14] Unfortunately in 49.3% of the children the etiology of visual loss could not be determined. This reflects limited scope for investigation, and lack of examination of family members in many cases. In the remaining children hereditary diseases came out as the predominant cause. This result is consistent with studies from other Asian countries such as Malaysia[15], Srilanka[16] and China[14], which show a mixed pattern between hereditary and unknown etiologies (a pattern similar to that in industrialized countries).

Surprisingly, only 4.9% of the children had vitamin A deficiency. This can be attributed to the location of the school in a relatively affluent area of the largest city of Pakistan. Thus causes of blindness associated with poverty and a high mortality are likely therefore to be underrepresented in this study. Otherwise Pakistan has been classified by the WHO as a country with severe sub-clinical vitamin A deficiency in parts or whole of the country[17], and studies conducted in different areas of Pakistan show that 32-43% children under 5 have deficient serum vitamin A levels.[18-19]

In Africa, corneal scarring from vitamin A deficiency, measles, and harmful traditional eye medicines predominate.[20] In India also the major cause of SVI/BL in children in blind schools is vitamin A deficiency.[21]

ROP was identified in only 3 children (2.1%). The lower incidence of ROP found in our study is probably the result of the much higher mortality of premature children in Pakistan, in particular in rural areas compared to developed countries. In the future ROP is likely to become a much bigger problem in Pakistan as neonatal services are bound to expand particularly in urban areas.

Thus, to effectively prevent childhood blindness, in Pakistan, in addition to mass vaccinations, vitamin A supplementation, we stress the need for screening for early detection. This will not only pick up diseases which are treatable if referred early but will also improve the prognosis after surgery. Genetic counseling has an important role to play in the prevention of blindness.

Efforts can only be fruitful if the people in the community are aware about possible screening.

The limitations of this study are that the findings need to be interpreted with great caution, as the data is not population based. The information does provide an indication of the relative importance of the different causes of childhood blindness. However they are subject to certain inherent biases. For e.g. children with multiple disabilities,

preschool age children those who have died, those from lower socioeconomic groups or from rural communities are likely to be underrepresented.

## References


1. World Health Organization. Preventing Blindness in Children. Report of a Who/IAPB Scientific meeting. Who/PBL/00.77.Geneva: WHO, 2000
2. Gilbert C, Foster A. Childhood blindness in the context of Vision 2020-the right to sight. Bull World Health Organ 2001; 79:227-32
3. Poverty & Disability: a Survey of the Literature, World Bank, 1999
4. World Health Organization. 1997. Global initiative for the elimination of avoidable blindness. WHO/PBL/97.61. Geneva: WHO, 1997.
5. Memon MS. Prevalence and causes of blindness in Pakistan. J Pak Med Assoc 1992, 42:196-8.
6. World Bank. World development report 1993: investing in health. New York, 1993 Oxford University Press.
7. World Health Organization. Resolution of the World Health Assembly: Elimination of Avoidable Blindness. Geneva, Switzerland: World Health Organization; 2003. Public WHA 56.26
8. Ezegwui IR, Umeh RE, Ezepue UF. Causes of childhood blindness: results from schools for the blind in south eastern Nigeria. Br J Ophthalmology 2003; 87: 20-3
9. World Health organization. International statistical classification of disease and related Health problems 10th revision. Geneva: WHO, 1992: 456-7.
10. Gilbert C, Foster A, Negrel D, Thylefors B. Childhood blindness: a new form for recording causes of visual loss in children. Bull World Health Organization 1993; 71: 485-9.
11. Kello AB, Gilbert C. Of severe visual impairment and blindness in children in schools for the blind Causes in Ethiopa. Br J Ophthalmol 2003; 87:526-30.
12. Gilbert C, Foster A. Blindness in children: Control priorities and research opportunities. Br. J. Ophthalmology 2001; 85: 1025-7.
13. Lewallen S, Courtright P. Blindness in Africa: present situation and future needs. Br J Ophthalmol 2001;85:897-903.
14. Hornby SJ, Xiao Y, Gilbert CE, Foster A, Wang X, Liang X, et al. Causes of childhood blindness in the Peoples's Republic of China: results from 1131 blind school students in 18 provinces. Br J Ophthalmol 1999; 83:929-932
15. Reddy SC, Tan BC. Causes of childhood blindness in Malaysia: results from a national study of blind school students. Int Ophthalmology 2001;24:53-9.
16. Eckstein MB, Foster A, Gilbert CE. Causes of childhood blindness in Sri Lanka: results from children attending six schools for the blind. Br J Ophthalmology 1995;79:633-6
17. WHO. Global prevalence of vitamin A deficiency MDIS Working Paper # 2. Geneva: WHO, 1995.
18. Paracha PI, Jamil A, Northrop-Clewes CA, Thurnham DI. Interpretation of vitamin A status in apparently healthy Pakistani children by using markers of subclinical infection. Am J Clin Nutr. 2000;72:1164-9.
19. Molla A, Badruddin SH, Khurshid M, Molla AM, Rahaman FN, Durrani S, et al. Vitamin A status of children in the urban slums of Karachi, Pakistan, assessed by clinical, dietary, and biochemical methods. Am J Trop Med Hyg. 1993;48:89-96.
20. Foster A, Sommer A. Corneal ulceration, measles, and childhood blindness in Tanzania. Br J Ophthalmol 1987;71:331-43.
21. Rahi JS, Sripathi S, Gilbert CE, Foster A. Childhood Blindness in India: Causes in 1318 blind school students in nine states. Eye 1995;9:545-50.