

Causes of blindness among students in blind school institutions in a developing country

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Genetic factors are the main causes of childhood blindness in developed countries (Sorsby, 1966; Fraser and Friedmann, 1967; Merin, Lapithis, Horowitz, and Michaelson, 1972; Goldstein, 1972). In developing countries infections as causes of blindness in childhood outnumber the genetic factors (Rodger, 1959; Phillips, 1961; Wilson, 1962; Olurin, 1970). Malnutrition in these countries resulting in xerophthalmia and keratomalacia is also an important cause of blindness (Awdry, Cobb, and Adams, 1967; *WHO Chronicle*, 1973).

Since the early 1960s the Eye Department of the Hadassah Hebrew University Hospital in Jerusalem has been sponsoring the ophthalmological care in many African countries (Michaelson, 1972). In Malawi sponsoring started in 1965. After 10 years a study was undertaken in order to evaluate the causes of blindness in the past, the current causes of blindness, and to assess the expectations for the future.

We report here a retrospective study on the causes of blindness as presented by students in blind school institutions all over Malawi.

Patients and methods

Two hundred and seventy students attending 17 blind school institutions were examined. The location of these schools is shown in the Figure. Admission to them is non-selective and depends on the number of vacant places available at the time of application. However, the following conditions play a role as selective factors. (1) Owing to tradition and culture fewer females than males apply. Therefore the relative proportion between sexes in this study does not reflect the real situation. (2) Blindness due to causes that may influence the life expectancy will not be found and their contribution to 'all' causes of blindness will not be shown in this study. (3) Admission to the blind schools is generally at the age of 4 to 6 years, therefore most cases will represent mainly the causes of blindness in childhood.

The criteria for admission to the blind school institu-

tions are good health and sight of 1/60 or less in the better eye. Until this study this selection was arbitrarily performed by the teachers of the schools or the medical assistant. The students were not examined by an ophthalmologist before admission. We think that the students in these institutions represent an adequate picture of the main causes of childhood blindness in Malawi in the past.

We examined all students attending the above schools during the period from June to December 1975. The examination included a testing of visual acuity, external examination, tonometry, and ophthalmoscopy. These



FIGURE Location of blind school institutions in Republic of Malawi

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were performed in the school. When necessary, doubtful cases needing further investigation were referred to the eye department of the Queen Elizabeth Central Hospital in Blantyre. Histories were obtained from the patients, school records, and, when possible, from relatives or parents.

Results

Seventy-three per cent of the students lost their vision before the age of three. Only 15.9 per cent were blind after the age of six (Table I). Ocular infections were responsible for 75.2 per cent of all cases of blindness. Measles was the underlying factor in 43.7 per cent, while smallpox was found in 5.2 per cent (Table II). A history of ocular infection (most probably bacterial), including ophthalmia neonatorum, was obtained in 26.3 per cent. In most of these cases a history of use of traditional medicine was obtained. Practically none of these cases was examined in the acute stage by an ophthalmologist or an ophthalmic assistant. The extensive scarring along with the symblepharon seen in many cases was most probably due to the

Table I Age at onset of blindness among 270 students

Age (years)	Male		Female		Total	
	No. of cases	Per cent	No. of cases	Per cent	No. of cases	Per cent
< 1	25	9.3	8	3.0	33	12.3
1-3	110	40.7	54	20.0	164	60.7
4-6	23	8.5	7	2.6	30	11.1
> 6	36	13.3	7	2.6	43	15.9
Total	194	71.8	76	28.2	270	100

Table II Causes of blindness according to age and sex in 270 students

Causes	Age (years)								Total	
	10		11-15		16-20		20			
	Male	Female	Male	Female	Male	Female	Male	Female	No.	Per cent
Measles*	23	19	32	17	16	7	2	—	118	43.7
Smallpox*	—	—	6	3	2	1	2	—	14	5.2
Bacterial infections*	4	3	20	6	16	2	20	—	71	26.3
Congenital cataract	2	1	1	1	1	—	1	—	7	2.6
Microphthalmos	—	2	—	1	1	—	—	—	4	1.5
Optic atrophy	—	1	3	—	1	—	3	—	8	3.0
Macular degeneration	—	—	—	—	—	—	2	—	2	0.7
Unspecified	11	6	9	5	7	—	8	—	46	17.0
Total	42	32	71	33	44	10	39	—	270	100.0

Measles was implicated as a cause of blindness in each case where a history of blindness after measles infection was obtained
Smallpox was implicated as a cause of blindness in each case where a history of blindness after smallpox infection was obtained
Bacterial infections were implicated as a cause of blindness when a history of ocular 'infection' without any systemic involvement was obtained
*Most of these cases used local medicine as the first attempt for treatment. Some of them sought treatment in hospital at a later stage

Table III Aetiology and suggested intervention in 37 blind students having some hope of partial recovery of vision

Diagnosis	Aetiology	No. of cases	Suggested intervention
Total leucoma cornea	Measles	9*	Corneal grafts
	Bacterial infection	6	Corneal grafts
	Smallpox	1	Corneal grafts
Leucoma centralis adherens	Measles	5	Optical iridectomy
	Bacterial infection	4	Optical iridectomy
	Smallpox	2	Optical iridectomy
Congenital cataract	Hereditary	5	Aspiration of lenses
	Hereditary	2†	Refraction
Complicated cataract	Unspecified	1	Aspiration of lenses
Corneal dystrophy	Hereditary	1	Corneal graft
High myopia (albino)	Hereditary	1	Refraction

*Any patient having some hopes for recovery of vision, at least in one eye, was considered as one case

†In these two cases lenses were aspirated previously. However, as they were not provided with glasses they were considered as blind (see also Table IV)

aggravating effect of the instillation of the traditional medicine. Hereditary causes were found in 21 cases (7.8 per cent). Congenital cataracts were responsible for 2.6 per cent while optic atrophy of unknown cause was found in eight cases (3.0 per cent). The prevalence of microphthalmos and macular degeneration was 1.5 and 0.7 per cent, respectively (Table II). Forty-six cases (17.0 per cent) were classified as 'unspecified' as the cause of the blindness was unknown. In some of these a history was impossible to obtain.

Table IV Resulting visual acuity after intervention in 11 cases

Diagnosis	Aetiology	Visual acuity before intervention		Intervention	Visual acuity after intervention		Comments
		Right	Left		Right	Left	
Leucoma adherens right eye	Measles	PL	—*	Optical iridectomy	1/240	—	Vitreous organization
Leucoma adherens both eyes	Measles	1/60	PL	Optical iridectomy	6/24	HM	Vitreous opacities left eye
Leucoma adherens both eyes	Measles	1/60	2/60	Optical iridectomy	6/60	6/36	
Leucoma adherens right eye	Measles	1/120	—*	Optical iridectomy	4/60	—	
Leucoma adherens both eyes	Smallpox	PL	2/60	Optical iridectomy	HM	6/18	Cataract right eye
Leucoma adherens both eyes	Bacterial infection	PL	PL	Optical iridectomy	6/60	HM	
Complicated cataract	Unspecified	PL	PL	Aspiration	PL	PL	Retrolental organization both eyes
Congenital cataract	Hereditary	2/60	1/60	Refraction	5/60	6/60	State after aspiration both eyes†
Congenital cataracts	Hereditary	1/60	1/60	Refraction	4/60	4/60	State after aspiration both eyes†
Congenital cataracts	Hereditary	PL	PL	Aspiration	4/60	4/60	
Congenital cataracts	Hereditary	PL	PL	Aspiration	4/60	4/60	

*Phthisis bulbi PL = perception of light HM = hand movements

†In these two cases lenses were aspirated previously. However, as they were not provided with glasses they were considered as blind (see also Table III)

Among the 270 students examined we found that 37 cases (13.7 per cent) should have a trial of surgical intervention (Table III). Eleven patients were surgically treated; nine of them regained useful vision (Table IV). We estimated that a further 26 cases could be similarly helped.

Discussion

Measles as a cause of blindness was found in 43.7 per cent of the cases in our study. Earlier surveys in Zambia incriminated this virus as a cause of blindness in 81.3 per cent (Phillips, 1961). Traditional medicine is still widely used in Malawi, although to a progressively less extent. 'Fresh' cases presenting after the instillation of some traditional medicines often give a picture of acid or alkaline burn. During a period of a few months we saw 30 cases where both corneae were destroyed and uvea prolapsed as a result of the use of traditional medicine for the treatment of bilateral ocular infection. The best outcome in these cases is a total vascularized leucoma or a large anterior staphyloma, and the worst (unfortunately the most common) phthisis bulbi (Chirambo and BenEzra, to be published).

Despite the widespread use of traditional medicine and its still important role in the induction of

childhood blindness in Malawi, the high frequency of blindness due to infectious agents (plus traditional medicine) as found in this study and in that of Merin (1967) has dropped drastically during the last 10 years. From an incidence of at least 300 blind children per 100 000 in the early 1960s the incidence has dropped to 34 cases per 100 000 children under five years of age (BenEzra and Chirambo, to be published).

We evaluated 13.7 per cent of the blind students as having some chances of partial recovery of vision. A preliminary attempt has shown that in nine cases out of 11 treated a useful vision of 4/60 to 6/18 in the better eye has been restored. This vision will enable most of these patients to conduct a normal life. Clearly, any future applicant to the blind school institutions should be examined by an ophthalmologist before admission.

Summary

Out of 270 students in 17 blind school institutions in Malawi 73 per cent were blind before the age of three. The most common cause for the blindness was ocular infection (75.2 per cent). Measles, as a single cause, was responsible for 43.7 per cent of the cases and smallpox for 5.2 per cent. Bacterial infections were incriminated in 26.3 per cent of the

cases. Most of these had received traditional medicine during the acute phase of the disease. Hereditary factors as causes of blindness were found in 7.8 per cent of the cases. These included congenital cataracts (2.6 per cent), optic atrophy of unknown origin (3.0 per cent), microphthalmos (1.5 per cent), and macular degeneration (0.7 per cent).

Careful ophthalmological examination showed

that in 37 cases an intervention could be attempted in order to improve the vision. In the 11 most favourable cases this was attempted, with the result that nine cases gained a useful vision of 4/60 to 6/18 in the better eye.

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References

- AWDRY, P. N., COBB, B., and ADAMS, P. C. G. (1967) *Cent. Afr. J. Med.*, **13**, 197
- FRASER, G. R., and FRIEDMANN, A. I. (1967) 'The Causes of Blindness in Childhood: a Study of 776 Children with Severe Visual Handicaps', pp. 1-245. Johns Hopkins Press, Baltimore
- GOLDSTEIN, H. (1972) *Publ. Hlth Rev.*, **1**, 41
- MERIN, S. (1967) *Malawi med. Bull.*, **2**, 6
- , LAPITHIS, A. G., HOROWITZ, D., and MICHAELSON, I. C. (1972) *Amer. J. Ophthalm.*, **74**, 538
- MICHAELSON, I. C. (1972) 'Causes and Prevention of Blindness', pp. 57-58. Academic Press, New York and London
- OLURIN, O. (1970) *Amer. J. Ophthalm.*, **70**, 533
- PHILLIPS, C. M. (1961) *Cent. Afr. J. Med.*, **7**, 153
- RODGER, F. C. (1959) 'Blindness in West Africa', pp. 1-102. Lewis, London
- SORSBY, A. (1966) 'The Incidence and Causes of Blindness in England and Wales 1948-62', pp. 1-79. HMSO, London
- WHO Chronicle* (1973) **27**, 21
- WILSON, J. (1962) *Cent. Afr. J. Med.*, **8**, 106