SCIENTIFIC REPORT

Prevalence and causes of blindness and low vision in leprosy villages of north eastern Nigeria

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Aims: To determine the prevalence and spectrum of ocular pathology, and the prevalence and causes of blindness and low vision in leprosy villages of north eastern Nigeria.
Methods: People affected by leprosy, aged 30 years and above, resident in eight leprosy villages were invited to participate. Ocular examination was undertaken of each consenting individual.
Results: 480 people were examined. 456 (48%) of 960 eyes had at least one ocular lesion, but only 37% of all lesions were leprosy related and potentially sight threatening. The prevalence of blindness (VA<3/60 with available correction) was 10.4%. An additional 7.5% of subjects were severely visually impaired (3/60 ⩽ VA<6/60). Cataract was the commonest cause of blindness. Other major causes were non-trachomatous corneal opacity and trachoma.
Conclusions: Blindness and low vision are highly prevalent among leprosy patients in this setting. Only a third of the burden of ocular pathology is related to the direct effects of leprosy. Efforts to reduce the backlog of cataract and trichiasis, to improve early detection and management of lagophthalmos, and to provide refractive services are urgently required.

In 2000, the most recent year for which global data are available, 719 330 new cases of leprosy were registered, and leprosy was still considered a public health problem in 15 countries.[1] At least 10 million people have been treated for leprosy with multidrug therapy (MDT: dapsone, rifampicin, clofazimine) worldwide.[2] Before the introduction of MDT in the early 1980s, millions more received dapsone monotherapy. Successful completion of treatment, however, does not necessarily prevent development of long term sequelae.[3 4] Disabilities in leprosy predominantly affect limbs and eyes, and result in social discrimination and rejection in many societies. Best current estimates suggest that there are about 200 000–300 000 blind people affected by leprosy (PAL).[5]

In order for leprosy control and blindness prevention programmes to be able to plan eye care services, data on the prevalence and causes of blindness and low vision in PALs are required. This study aims to determine these parameters for residents of leprosy villages in north eastern Nigeria.

PATIENTS AND METHODS

There are 13 leprosy villages in the 13 states of north eastern Nigeria. Eight (selected on the basis of accessibility) were included in this study. All residents of these villages aged 30 years or above were invited to participate if they: (i) were currently on MDT; (ii) had completed MDT, or (iii) had completed dapsone monotherapy. After explaining the purpose and conduct of the study, verbal consent was obtained. For each consenting individual, data on age, sex and duration since diagnosis of leprosy were recorded. The type of leprosy (multibacillary or paucibacillary) was determined from the subject's medical notes (where sufficient information had been recorded) or by inference from the subject's description of their treatment regimen. Visual acuity (VA) was assessed using the Snellen or illiterate E chart at 6 metres, using available correction for those with spectacles. Aphakic subjects had their VA assessed with a +10 (aphakic) lens if no spectacles were available. Definitions of blindness and visual impairment were: VA = 6/18, normal; 6/60 = VA<6/18, visual impairment; 3/60 = VA<6/60, severe visual impairment; VA<3/60, blind. Subjects unable to see 6/18 had their VA re-assessed with pinhole.

All subjects were then examined by an ophthalmologist (CM) using a pen torch and direct ophthalmoscope. Cataract was defined as the presence of lens opacity. Trachomatous corneal opacity was defined as the presence of corneal opacification in an eye with corrected or uncorrected entropion or trichiasis (including evidence of recent epilation). Non-trachomatous corneal opacity was defined as the presence of corneal opacity without corrected or uncorrected entropion or trichiasis. Glaucoma was defined as the presence of a pale, cupped disc with a cup to disc ratio of 0.8 or more. Aphakia was defined as absence of the lens. Uveitis was defined as the presence of active uveal inflammation or evidence of previous uveal inflammation, such as miosed pupil, posterior synechiae, or iris atrophy. Refractive error was defined as visual acuity <6/18 with available correction that improved to 6/18 or better with pinhole. For those unable to see 6/18 with pinhole, clinical judgment was used to determine the main cause of visual impairment or blindness. If two or more pathologies were adjudged to contribute equally, visual impairment or blindness was attributed to the most treatable cause.

Data were entered in Epi-Info 6.04d (World Health Organization, Geneva, Switzerland), and analysed in Epi-Info and Stata 7 (Stata Corp, College Station, TX, USA). Using multiple logistic regression, age, sex, time since diagnosis, and type of leprosy were modelled as potential risk factors for being functionally blind.

Individuals identified as having treatable ophthalmic conditions were offered free surgery and/or medical care, as appropriate. The study was approved by ethics committees of the Jos University Teaching Hospital and the London School of Hygiene and Tropical Medicine.

RESULTS

A total of 480 people met the inclusion criteria and were examined. No eligible individual present in the villages during the study refused participation. Some residents may have declined to participate by being absent. A total of 211 (44.0%) females and 269 (56.0%) males were seen; ages

Abbreviations: MDT, multidrug therapy; PAL, people affected by leprosy; VA, visual acuity

Table 1 Ocular lesions in the study population (480 subjects, 960 eyes)

Lesion	No of eyes with lesion	Prevalence of lesion among all eyes (%)
Lens opacity	321	33.4
Corneal opacity	149	15.5
Lagophthalmos <6 mm	94	9.8
Lagophthalmos >6 mm	27	2.8
Entropion/trichiasis	89	9.3
Refractive error	50	5.2
Retinal pathology	34	3.5
Uveitis	21	2.2
Total number of lesions	785 (in 456 eyes)	

Table 2 Visual status of study subjects

Vision	Number of subjects	% (95% CI)
Normal	325	67.7 (63.3 to 71.8)
Visual impairment	69	14.4 (11.4 to 17.9)
Severe visual impairment	36	7.5 (5.4 to 10.3)
Blind	50	10.4 (7.9 to 13.6)
Total	480	100

ranged from 30 to 96 years. Of 480 subjects, 90 (18.8%; 37 females, 53 males) were classified as having paucibacillary leprosy; 230 (47.9%; 95 females, 135 males) were classified as having multibacillary leprosy. The type of leprosy could not be determined in 160 (33.3%) individuals.

Ophthalmic pathology

Of 960 eyes, 456 (47.5%) eyes had at least one pathology; many eyes had more than one lesion. The commonest problem was lens opacification, which was seen in one in three eyes (table 1). Nearly one eye in 10 had entropion or trichiasis. More than one eye in 20 had a refractive error that reduced VA to <6/18.

Visual status

The prevalence of functional blindness (VA<3/60[6]) was 10.4% (95% CI 7.9 to 13.6) (table 2). If blindness had been defined as VA<6/60 (corresponding to grade 2 disability on the WHO scale[7]), the prevalence of blindness would have been 17.9% (95% CI 14.6 to 21.7).

The WHO disability scale[7] considers eyes rather than people. Of 960 eyes examined, 504 had grade 0 disability (no evidence of visual loss), 150 had grade 1 disability (evidence of visual loss, but VA 6/60 or better), and 306 had grade 2 disability (severe visual impairment; VA<6/60).

Causes of visual impairment and blindness

Cataract was the commonest cause of both visual impairment and blindness, being responsible for 46% of blindness (table 3). Nearly one third of the blind (2.9% of all subjects examined) had bilateral non-trachomatous corneal opacity, and can therefore be considered blind due to direct complications of leprosy.

Risk factors for blindness

In logistic regression analyses, increasing age was the only identified risk factor for being functionally blind (table 4).

DISCUSSION

Most of the world's leprosy sufferers live in developing countries, where they are triply disadvantaged: the prevalence of many other diseases is high; medical care is very limited; and stigmatisation—an experience common to leprosy patients in all societies—limits use of the scarce medical services that are available. Resulting delays in treatment worsen long term outcomes.

Table 3 Main cause of any visual impairment (including visual impairment, severe visual impairment, and blindness) and main causes of blindness

	Any visual impairment (VI)		Blindness	
Cause	Number (prevalence, %)	Proportion of all cases of VI (%)	Number (prevalence, %)	Proportion of all cases of blindness (%)
Cataract	80 (17)	52	23 (5)	46
Non-trachomatous corneal opacity	26 (5)	17	14 (3)	28
Aphakia	20 (4)	13	3 (0.6)	6
Trachomatous corneal opacity	13 (3)	8	6 (1)	12
Glaucoma	9 (2)	6	3 (0.6)	6
Others	7 (2)	5	1 (0.2)	2
Total (all causes)	155 (32)	100	50 (10)	100

Table 4 Results of logistic regression analyses modelling risk factors for having VA <3/60

"Exposure"	Exposed/seen (%)	Adjusted odds ratio (95% CI)
Female	211/480 (44.0)	0.86 (0.36 to 2.07)
Age (for each year)	Not applicable	1.04 (1.01 to 1.07)
>10 years since diagnosis	328/480 (68.3)	1.56 (0.46 to 5.28)
Paucibacillary leprosy	90/320* (28.1)	1.06 (0.42 to 2.67)

*Type of leprosy could not be determined for 160 patients.

Nearly half of all eyes of leprosy village residents examined in this study had one or more identifiable ocular lesions. Using WHO's definition of functional blindness, more than one in 10 (10.4%) were blind, and more than one in six (17.9%) had VA<6/60. These very high prevalences of ocular pathology and blindness may be due to the relatively long history of leprosy in and advanced age of the subjects in this study, and the fact that five of eight study villages were in a trachoma endemic area.[8] The prevalence of blindness among PALs elsewhere in Nigeria has been estimated at 2.9% in the north west, where blinding trachoma is found,[9] and 9.7% in the south east, where trachoma does not constitute a public health problem.[10]

As is generally true in PALs,[11] cataract was the commonest cause of blindness. Provision of an adequate cataract surgical service could nearly halve the burden of blindness in this population. Corneal opacity was the second most common blinding condition: 28% of the blind had corneal opacity without associated trichiasis or entropion, while 12% had corneal opacity and trichiasis or entropion. We labelled the latter category as "trachomatous" because trachoma is endemic in this area. However, leprosy itself can also cause trichiasis and entropion[12]; aetiology should be determined by examining for blepharochalasis (which may not be detectable at the time of examination), and for conjunctival scar. In this study, lids were not everted, so we may have overestimated (at leprosy's expense) the contribution made by trachoma to corneal opacification in these subjects. Based on funduscopic findings, glaucoma was identified as being responsible for only 6% of blindness. Glaucoma is thought to be uncommon in leprosy, perhaps because mean intraocular pressure is lower in those with leprosy than those without.[13]

Though completion of an appropriate course of anti-leprosy chemotherapy changes an individual's classification from "under active treatment" to "cured" in the registers of many leprosy control programmes, it does not prevent subsequent development of disabling complications,[5] particularly those of the eye.[12 14] Nigeria's annual leprosy case detection rate in 2003 was 0.37/10 000 population, whereas its estimated nationwide leprosy prevalence is 0.45/10 000 (personal communication, Statistics Unit, National Tuberculosis and Leprosy Control Programme, Federal Ministry of Health, Abuja, Nigeria): most new patients successfully complete a course of MDT and are regarded as cured. Cured leprosy patients, however, will require ongoing ophthalmic care. There is an urgent need for better collaboration between leprosy control and blindness prevention programmes to enable this group to access high quality comprehensive eye care services. In the communities studied here, cataract surgery, early detection and management of lagophthalmos, and refractive services are all priorities. Additionally, a number of villages require community based trachoma control, with an emphasis on lid surgery.[15] Reducing the incidence and prevalence of blindness and low vision in these patients will ease their suffering and increase their chance of social and economic rehabilitation.

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