

# Training for primary eye care in leprosy

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*Reported are the results of a primary eye care training programme for community-based leprosy control workers in the Republic of Korea. The 20-hour programme emphasized the detection and management of lagophthalmos (and its complications) and chronic iridocyclitis. Leprosy patients in four resettlement villages were examined independently by the health workers and an ophthalmologist. Agreement between the health workers and the ophthalmologist was good for the detection of most signs (lagophthalmos, acute iridocyclitis, and chronic iridocyclitis). Based on these preliminary results it is recommended that primary eye care be included as a part of the training for leprosy paramedical workers*

## Introduction

The implementation of primary eye care programmes for leprosy patients has recently been recommended (1). Currently most leprosy health workers are not taught to recognize and treat the ocular complications of leprosy. In 1980, a survey in the Republic of Korea revealed that at least 40% of patients in resettlement villages had ocular complications of leprosy (2).

The Catholic Skin Clinic and Hospital, Taegu, Republic of Korea, is responsible for leprosy control in three counties that have a total population of 244 100, including 558 leprosy patients, who live in seven resettlement villages, and 690 resident leprosy patients. Four of these villages each have a community-based health worker who is also a leprosy patient.

We developed a short primary eye care training programme for the four health workers, carried out the training, and subsequently evaluated the abilities of three of these workers to diagnose the blinding complications of leprosy.

## Materials and methods

In October 1988, four health workers received a total of 20 hours of primary eye care training. These workers had previously participated in a 6-month training programme in leprosy control and had been working as community-based paramedical workers for at least 1 year prior to the initiation of the project; eye care was not included in earlier training programmes. The primary eye care training programme emphasized the detection and management of two

major blinding complications of leprosy: lagophthalmos, which often leads to exposure of the cornea, with keratitis, ulceration, and opacification; and chronic iridocyclitis (which is asymptomatic in these patients and can result in a miotic pupil), posterior synechiae (adhesions between the iris and lens), and complicated cataracts. Included also was training on visual acuity testing, and the detection of trichiasis (inturned eyelashes), reduced corneal sensation, and cataracts. Half the training time (10 hours) consisted of lectures and discussions, while the remainder involved supervised examination of leprosy patients at the clinic.

Following the training, the health workers examined patients in their respective resettlement villages, using a focusing slit pen torch and a visual acuity chart, and recorded the clinical signs observed on a standardized proforma (1). Subsequently, the patients were examined by an ophthalmologist who used the same equipment and procedure as the health workers and recorded the results on the same proforma. The findings of the health workers were compared with those of the ophthalmologist for each of the clinical signs examined (see Table 1). The statistical significance of the association of examinations (ophthalmologist versus health worker) and the homogeneity of the association among the health workers were assessed using the  $\chi^2$  test (3, 4).

## Evaluation of clinical signs

Involuntary blinking was recorded as present or absent over a 15-second period. Exposure of the globe (cornea or bulbar conjunctiva) was evaluated upon gentle closure (patients were requested to close their eyes as in sleep) and upon forced closure (patients were requested to squeeze their eyelids together). Examinations for any small amount of exposure that might be present in either gentle or forced closure were carried out using the pen torch. Trichiasis was defined as the presence of one or more lashes that touched the cornea or conjunctiva.

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The following qualities of the cornea were evaluated: surface topography and lustre, and sensation. The surface was judged to be either "smooth and shiny" or "dull and rough". Corneal sensation was recorded as normal or deficient, depending on whether or not the patient exhibited any reaction when the cornea was touched with a wisp of cotton. Patients were asked to look up while the cornea was touched with the cotton wisp at the 6 o'clock (inferior) position.

Health workers evaluated the conjunctiva by the presence or absence of "red-eye", and, if this was present, they judged whether it was perilimbal or diffuse.

Pupil size was recorded as normal or constricted (diameter < 2 mm) under indoor artificial lighting conditions.

A cataract (presence of a whitish or grey pupil on inspection) was recorded as present or absent.

## Results

A total of 208 leprosy patients (416 eyes) were examined by both the health workers and by the ophthalmologist. One health worker did not conduct examinations in his village because of a prolonged illness. A slightly greater number of patients were female (female:male = 1.12:1) and over 50 years of age. More than half of the study population had been diagnosed to have leprosy 30 or more years previously. Altogether, 13 subjects (6%) were blind (vision of < 3/60 in the better eye) and 17 (8%) had a vision of < 6/60 in the better eye.

The prevalence of each of the nine clinical signs of ocular involvement, the sensitivity and specificity of health worker's examinations, and the values of Youden's *J* statistic (to assess agreement) are shown in Table 1. The value of Youden's *J* statistic can range from -1.0 to +1.0, with -1.0 representing complete disagreement, 0 agreement no better than that caused by chance alone, and +1.0 complete agreement.

All the health workers accurately detected the presence of lagophthalmos, with a sensitivity of 84% for abnormal involuntary blink, 78% for abnormal gentle closure, and 90% for abnormal forced closure, compared with the assessment made by the ophthalmologist. The specificity was equally high for the health workers and the ophthalmologist. Trichiasis was found in only 20 eyes (5%) by pen torch examination; the health workers did not accurately detect this condition.

Agreement between the assessment of corneal topography and lustre made by the health worker and the ophthalmologist was good (Youden's  $J = +0.57$ ). There was some overreporting (false

positives) for this sign, primarily for cases of lagophthalmos. Reduced corneal sensation was not detected by health workers in almost half (44%) of the cases.

There were no patients with acute iridocyclitis in the study population, and health workers did not suggest this diagnosis. Conjunctival redness due to other causes was detected in 26 eyes (6% of the total); however, the health workers accurately reported this sign only in 54% of these eyes. All the health workers were more likely to record redness of the conjunctiva in the presence of lagophthalmos.

Constricted pupils were observed in 66 eyes, and the health workers accurately detected 48 of them (sensitivity, 73%).

Less than half of the cataracts in the study patients were detected by the health workers, although their specificity for this clinical condition was high.

## Discussion

In most countries, primary health care for leprosy patients is provided by health workers (5); however, health workers have been underused for the detection and management of ocular leprosy. In most leprosy control programmes, the responsibilities of health workers focus on detection and case management of the disease and such workers therefore have little contact with patients who have had the disease for a long time. However, patients with newly detected multibacillary leprosy often exhibit signs of ocular pathology, and although some of these can be detected only with the aid of a slit lamp, others can be recognized by torch examination alone.

The following ocular complications of leprosy are potentially treatable: lagophthalmos, corneal changes (superficial keratitis and corneal ulceration secondary to trauma on a cornea with reduced sensation), and iridocyclitis.

As we have shown in this study, health workers with minimal training can accurately detect the presence of lagophthalmos. A diagnosis of this condition is made by assessing involuntary blink and patients' ability to close their eyes completely upon gentle and forced closure. Evaluation of these functions provides a quantitative scale of severity of lagophthalmos and establishes criteria for appropriate therapy. Surgical correction was recommended for patients who had exposure of the globe on forced closure; those with exposure on gentle closure were instructed to exercise their eyelids and to use a bland lubricant to keep the cornea moist. Patients with any degree of lagophthalmos were noted for special attention on follow-up. Assessment of the involuntary blink pattern is more subjective than that of other signs of lagophthalmos; furthermore, it is usually accompanied by failure to

Table 1: Level of agreement between the ophthalmologist and the health workers for the detection of clinical signs of ocular involvement in leprosy patients ( $n = 700$  eyes)<sup>a</sup>

Clinical sign	No. with clinical sign	Youden's <i>J</i> statistic	Sensitivity (%)	Specificity (%)
<i>Lagophthalmos</i>				
Reduced involuntary blinking	127 (18) <sup>b</sup>	+0.82	84	98
Gentle closure	151 (21)	+0.76	78	98
Forced closure	110 (16)	+0.88	90	98
<i>Other eyelid changes</i>				
Trichiasis	37 (5)	+0.13	15	98
<i>Conjunctival changes</i>				
"Red-eye" (acute uveitis)	0 (0)	NA <sup>c</sup>	NA	NA
"Red-eye" (other causes) <sup>d</sup>	47 (7)	+0.47	54	93
<i>Cornea</i>				
Surface	64 (9)	+0.57	92	65
Sensation	71 (10)	+0.45	56	89
<i>Pupil</i>				
Constricted	105 (15)	+0.44	73	71
<i>Lens</i>				
Cataract	60 (9)	+0.36	47	89

<sup>a</sup> The prevalence of the clinical findings is based on a total of 350 patients (700 eyes) who were examined in four resettlement villages. The measures of agreement are based on the results for the 208 patients (416 eyes) seen by both the ophthalmologist and health workers in three of these villages.

<sup>b</sup> Figures in parentheses are percentages.

<sup>c</sup> NA=not applicable (there were no patients with this condition).

<sup>d</sup> For the three health workers, the sensitivity and specificity, respectively, were as follows A 91% and 82%, B, 18% and 97%; and C 50% and 96%.

close the eye completely on gentle closure, and was only detected in two eyes with normal gentle closure. Thus in future training programmes for health workers who deal with patients who have had leprosy for long periods it is unnecessary to include this sign.

Trichiasis is an uncommon finding in leprosy patients who exhibit no evidence of trachoma. However, the combination of trichiasis, a cornea with reduced sensation, and lagophthalmos places the cornea at risk of abrasion, ulceration, and scarring. Inadequate practice in the training sessions, coupled with the rarity of trichiasis and the lack of loupes, may explain why the health workers showed poor agreement with the ophthalmologist for this sign. Small, fine lashes are difficult to detect with a torch alone, and in training sessions extra emphasis needs to be put on finding them.

Pathological changes in the cornea, e.g., keratitis, are common in leprosy but they are difficult to detect during the early stages of the disease without the aid of a slit lamp. As these changes progress, however, they become visible with a torch alone. There was considerable overreporting of corneal surface defects by all three health workers, who were 4.3 times (95% confidence interval: 2.3, 8.2) more likely than the ophthalmologist to categorize eyes with lagophthalmos as "dull or rough". Patients with a

"dull or rough" cornea received a bland lubricant, as did those with lagophthalmos, and were referred for therapy if the condition persisted. Thus, the over-reporting of this sign did not result in consequences that were detrimental to patients.

Measurement of corneal sensation has not been accurately quantified and standardized. Furthermore, the level of sensation that is necessary to afford the cornea protection is not known. Use of a cotton wisp is probably the least quantifiable of all the methods used to determine corneal sensation, but it can readily be carried out in developing countries. For the present, health educators, health workers, and ophthalmologists are likely to rely on the cotton wisp as a tool for diagnosing reduced corneal sensation; the fair agreement between the health workers and the ophthalmologist suggests that the former can recognize this condition. Patients with decreased corneal sensation are at increased risk of developing corneal disease and need to be targeted for observation by health workers.

The occurrence of "red-eye" in leprosy patients may have a number of causes and it may be difficult for health workers to differentiate these. Acute iridocyclitis occurs infrequently during the course of multibacillary leprosy (albeit with blinding consequences) and it is difficult to detect through cross-sectional

study methodologies. Conjunctival redness caused by bacterial or viral conjunctivitis is probably the most common explanation; thus, the health workers were instructed to administer tetracycline ointment and follow up patients after 48 hours to see whether their condition had improved. Many of the cases of conjunctival redness detected by the health workers involved patients with exposure of the globe due to lagophthalmos. Administration of tetracycline ointment to such patients protects the cornea from drying and ulcerating. Thus, although the health workers only detected 14 of 26 eyes (54%) with a red conjunctiva, they reported 24 of 26 eyes (92%) with a red conjunctiva or lagophthalmos.

It has been suggested that iris changes are the most common predictor of blindness in patients with multibacillary leprosy (6). The early signs of chronic iritis cannot be detected without the aid of a slit lamp; however, it is at this stage that patients would derive maximum benefit from ocular therapy. Ophthalmological (slit lamp) follow-up of early cases of the multibacillary form of the disease is not feasible for most leprosy control programmes. The alternative is therefore to ensure that health workers or physicians use torches to search for patients with pupils that have evidence of constriction, posterior synechia, or poor reaction. The prevalence of small pupils and synechia was 15% and 14%, respectively, in the study population. The difficulty in detecting a small pupil (diameter <2 mm) without the aid of a printed scale is probably responsible for most of the variation in the diagnosis of this condition between health workers and ophthalmologists. Synechia, which is frequently detected because of an irregular pupil, was diagnosed in 25 eyes (41% of the total number of eyes with synechiae) without evidence of small pupils. By including posterior synechia as a criterion for chronic iridocyclitis, health workers ought to be able to detect iridocyclitis more accurately. The detection of posterior synechia should therefore be included in future training programmes and this sign should be listed on the recording proforma.

The discrepancy in the diagnosis of cataract made by health workers and the ophthalmologist may have arisen because cataracts involving eyes with small pupils (69%) are less likely to be detected by health workers than those involving eyes with normal pupils (47%).

In summary, we conclude that the agreement between the health workers and the ophthalmologist in the detection of the major ocular complications of leprosy was good and we recommend that training programmes of the type we have described be developed in areas where ocular leprosy is a public health problem.

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## Résumé

### Formation en soins oculaires primaires dans la lèpre

Cet article donne les résultats d'un programme de soins oculaires primaires pour des malades atteints de lèpre dans des villages de réinstallation en République de Corée. En octobre 1988, quatre agents de santé ont été formés à la détection et au traitement de deux complications majeures de la lèpre, causes de cécité: la lagophthalmie et l'iridocyclite chronique. La période de formation de 20 heures portait également sur l'examen de l'acuité visuelle et la détection d'un trichiasis, d'une diminution de la sensibilité cornéenne et de cataracte. Après cette formation, les agents de santé ont examiné 208 malades pour recherche de ces signes. Les mêmes malades étaient ensuite examinés par un ophtalmologue et le degré de concordance entre les agents de santé et l'ophtalmologue était déterminé.

Tous les agents de santé ont parfaitement décelé la présence de trois stades de lagophthalmie, mais la présence d'un trichiasis était mal diagnostiquée, surtout parce qu'il était difficile avec la lampe utilisée de déceler la présence de petits cils fins dans les yeux des malades. Il y avait une bonne concordance pour la détection de la topographie et de la brillance de la cornée, de même que pour l'injection conjonctivale, bien que certains de ces signes aient été signalés en excès chez des malades ayant une lagophthalmie concomitante. Une iridocyclite chronique, définie comme étant une contraction de la pupille, existait dans 66 cas, dont 48 (73%) avaient été détectés par les agents de santé.

Sur la base de ces résultats préliminaires, nous recommandons que le personnel paramédical chargé de la lèpre reçoive une formation en soins oculaires primaires.

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