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Ocular findings in leprosy patients in an institution in Nepal (Khokana)

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SUMMARY A total of 466 leprosy patients in Nepal, some advanced cases, were surveyed for ocular lesions. 74·2% were found with ocular features, and 12·7% of the eyes were blind. The patients were classified in tuberculoid, borderline-borderline, and lepromatous groups. Lepromatous leprosy is responsible for major ocular complications and blindness.

Leprosy victims throughout the world total between 15 and 16 million.[1] Of this ever-increasing number at least 25% develop ocular involvement.[2] Nepal has an estimated total of 120 000 leprosy patients (1% of the population), which means about 30 000 patients need ocular service.

Khokana was established as a Leprosarium about 150 years ago. It is a small village located on the banks of the Bagmati River at the point of its exit from the Kathmandu Valley. Since its foundation it has served as the country's main asylum for socially unacceptable persons, the majority of whom have suffered or are suffering from leprosy. Until recently institutional care was confined to the basic supply of food, clothing, and dapsone medication. This situation was found to be increasingly unsatisfactory, and as a result a medical survey was taken in August 1978 under the aegis of the Nepal Leprosy Relief Association (NELRA). The team responsible comprised 1 leprologist, 2 medical officers, and 1 laboratory technician.

Diaminodiphenylsulphon (DDS) doses administered to the patients over the past several years varied greatly. They ranged from an extremely low dose of 25 mg per week (a regimen to which far more than 50% of the patients had been subjected), up to 50 mg, and even 100 mg daily in some cases. No firm statement can be made as to the regularity of distribution and supervision of drug intake over this long period. As a result the probability that several of the outstanding cases are resistant to DDS, or have at least developed secondary resistance to this drug, must be regarded as high. At present their number is estimated to be about 10% of all patients in Khokana.[3] The impressively high number of patients with severe eye complications—localised treatment had never been given before—deemed it necessary for a detailed ophthalmological survey, which led to the present study.

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Material and methods

A total of 466 patients (932 eyes) were examined in one of the outdoor clinic rooms in Khokana. The room had adequate natural light. There was no provision for slit-lamp microscopy. A well focused ordinary torch light and a 20 dispherical lens were used for the examination of the anterior segment of the eye. The fundus was examined with a Keeler binocular indirect ophthalmoscope. Cyclopentolate 1% and phenylephrine 5% drops were used to achieve mydriasis.

Lagophthalmos was graded: grade I, as shown by poor resistance to opening of the eyes; grade II, when there was an obvious lag with incomplete closure of the lids; and grade III, when there was total inability to close the lids, often associated with drooping of the lower lids and ectropion.

Corneal sensation was tested by approaching the eye from the side with a piece of cotton-wool while the patient was looking straight ahead. Intraocular pressure was measured by Schiotz's tonometer. Visual acuity was taken without correction. An eye was considered to be blind when visual acuity was below 6/60.

The classification of the disease followed the Five Group System (T/BT/BB/BL/L) proposed by Ridley and Jopling[4] and modified by Leiker.[5] As the

Table 1 *Distribution of patients in different types of leprosy: their age, sex, and the duration of disease*

Type	Sex	Age (in years)				Duration of disease (in years)			
		<20	20–40	>40	Total	<10	10–20	>20	Total
	Male	1	37	117	155	5	51	99	155
Tuberculoid	Female	—	47	85	132	7	34	91	132
(T)	Total	1	84	202	287	12	85	190	287
Borderline—	Male	1	1	2	4	—	2	2	4
borderline	Female	—	—	2	2	—	—	2	2
(BB)	Total	1	1	4	6	—	2	4	6
	Male	2	28	88	118	10	35	73	118
Lepromatous	Female	2	16	37	55	2	13	40	55
(L)	Total	4	44	125	173	12	48	113	173
	Male	4	66	207	277	15	88	174	277
T, BB, L	Female	2	63	124	189	9	47	133	189
	Total	6	129	331	466	24	135	307	466

Table 2 *Distribution of patients with and without ocular findings in different types of leprosy*

Type	Sex	Patients with ocular findings	Patients without ocular findings	Total
	Male	101	54	155
Tuberculoid	Female	85	47	132
(T)	Total	186	101	287
Borderline—	Male	3	1	4
borderline	Female	2	—	2
(BB)	Total	5	1	6
	Male	109	9	118
Lepromatous	Female	46	9	55
(L)	Total	155	18	173
	Male	213	64	277
T, BB, L	Female	133	56	189
	Total	346	120	466

number of patients within the different types of leprosy was small, the present study was confined to all types within 3 groups: (1) tuberculoid type (tuberculoid, borderline tuberculoid-inactive, and active); (2) borderline-borderline type; (3) lepromatous type (borderline lepromatous-inactive, active, reactional, lepromatous-inactive, active and reactional).

Since there were no significant differences in the findings between the sexes in these 3 groups, this aspect has been neglected, as have the borderline-borderline cases, where the total number of patients proved to be insignificant.

Results

Out of the total 466 patients examined 287 (61·6%) belonged to the tuberculoid type, 6 (1·3%) to the borderline-borderline type, and 173 (37·1%) to the lepromatous type. Only 6 patients (1·3%) were less than 20 years old, 129 (27·7%) were between 20 and 40, and 331 (71%) were older than 40 years. Only 24 (5·1%) had suffered from the disease for less than 10 years, 135 (29%) for between 10 and 20 years, and 307 (65·9%) had had leprosy for more than 20 years (the duration of disease recorded was derived from patients' statements; on occasion, duration was estimated) (Table 1).

In the group of patients with tuberculoid leprosy 186 (64·8%) showed ocular lesions; in the group with lepromatous leprosy, the number was 155 (89·6%) (Table 2).

The patients' age, duration of disease, and ocular findings in the 2 groups of leprosy are shown in Tables 3 and 4.

All patients' eyes were examined for any lesion in the posterior segment. The results showed that the tuberculoid group had 82 and the lepromatous 35, a total of 117 eyes (Table 5).

The large percentage of patients labelled blind, as seen in Tables 3 and 4, underwent a detailed examination for evaluation of the cause of their blindness. Results of these examinations are given in Table 6. Of the total 118 blind eyes 54 were tuberculoid and 60 lepromatous. The number with binocular and monocular blindness appeared the same in both groups. However, blindness was found more commonly in the lepromatous type: 60 (17·3%) blind eyes in 173 lepromatous patients (346 eyes) as opposed to 54 (9·4%) blind eyes in 287 tuberculoid patients (574 eyes).

Discussion

In the present series 287 patients had leprosy of tuberculoid type (T) and 173 of lepromatous type (L) out of a total of 466 patients. In both types the disease was found to be more common in males than females; 2:1 in lepromatous, 1·2:1 in tuberculoid. These findings are in accordance with those of Holmes.[6] 64·8% in tuberculoid type and 89·6%

Table 3 *Incidence of ocular findings in the tuberculoid type of leprosy with age and duration of disease*

Findings		*Age (in years)*				*Duration of disease (in years)*			
		<20 %	*20–40* %	*>40* %	*Total* %	*<10* %	*10–20* %	*>20* %	*Total* %
ADNEXA	Loss of eyebrows	—	1·2	7·4	5·6	(8·3)	5·9	5·3	5·6
	Loss of eyelashes	—	—	3·0	2·1	—	2·4	2·1	2·1
	Trichiasis	—	—	1·5	1·0	—	—	1·6	1·0
	Lagophthalmos I	—	16·7	16·3	16·4	—	17·6	16·8	16·4
	II	—	11·9	9·4	10·1	—	14·1	8·9	10·1
	III	—	3·6	12·9	10·1	—	8·3	14·7	10·1
CONJUNCTIVA	Pterygium	—	—	3·5	2·4	—	7·0	0·5	2·4
	Conjunctivitis	—	—	5·4	3·8	—	2·4	4·7	3·8
CORNEA	Keratitis/ulcer	—	—	4·5	3·1	—	1·2	4·2	3·1
	Opacity/vascularity	—	1·2	8·4	6·2	—	5·9	6·8	6·2
	Loss of sensation	—	3·6	8·4	6·9	—	5·9	7·9	6·9
IRIS	Iritis/KP	—	—	0·5	0·3	—	1·3	—	0·3
	Posterior synechiae	—	2·4	8·9	6·9	(8·3)	4·7	7·9	6.9
LENS	Cataract	—	2·4	31·7	22·9	(8·3)	17·6	26·3	22·9
SCLERA	Scleritis/episcleritis	—	—	—	—	—	—	—	—
	Staphyloma	—	—	—	—	—	—	—	—
VITREOUS	Abnormality	—	—	4·5	3·1	—	3·5	3·2	3·1
FUNDUS	Abnormality	—	11·9	20·3	17·7	(25·0)	11·8	20·0	17·7
TENSION	More than 21 mmHg[1 4]	—	—	2·0	1·4	(8·3)	2·4	0·5	1·4
VISION	less than 6/60	—	3·6	18·3	13·9	(8·3)	8·2	16·8	13·9

KP = keratic precipitates.

Table 4 *Incidence of ocular findings in the lepromatous type of leprosy with age and the duration of disease*

Findings		*Age (in years)*				*Duration of disease (in years)*			
		<20 %	*20–40* %	*>40* %	*total* %	*<10* %	*10–20* %	*>20* %	*Total* %
ADNEXA	Loss of eyebrows	—	65·9	77·8	73·4	(41·7)	68·6	78·8	73·4
	Loss of eyelashes	—	27·3	42·9	38·1	(8·3)	35·4	42·5	38·1
	Trichiasis	—	9·1	4·8	5·8	(8·3)	8·3	4·4	5·8
	Lagophthalmos I	—	6·8	23·0	18·5	(16·7)	12·5	21·2	18·5
	II	—	9·1	10·3	9·8	(8·3)	2·1	13·3	9·8
	III	—	2·3	4·8	4·1	(8·3)	4·2	3·5	4·1
CONJUNCTIVA	Pterygium	—	2·3	1·6	1·7	—	—	2·7	1·7
	Conjunctivitis	—	9·1	10·3	9·8	—	6·3	12·4	9·8
CORNEA	Keratitis/ulcer	—	—	4·8	3·5	(8·3)	2·1	3·5	3·5
	Opacity/vascularity	—	11·4	17·5	15·6	(8·3)	6·3	20·4	15·6
	Loss of sensation	—	2·3	7·9	6·4	(16·7)	—	8·0	6·4
IRIS	Iritis/KP	—	4·5	1·6	2·4	(16·7)	2·1	0·9	2·4
	Posterior synechiae	—	36·4	39·7	38·2	(16·7)	39·6	39·8	38·2
LENS	Cataract	—	6·8	31·7	24·9	(8·3)	18·8	29·2	24·9
SCLERA	Scleritis/episcleritis	—	2·3	1·6	1·8	—	2·1	1·8	1·8
	Staphyloma	—	—	1·6	1·2	—	—	1·8	1·2
VITREOUS	Abnormality	—	2·3	4·8	4·1	(16·7)	4·2	2·7	4·1
FUNDUS	Abnormality	—	—	15·1	11·0	(8·3)	14·6	9·7	11·0
TENSION	more than 21 mmHg	—	4·5	3·2	3·5	—	4·2	3·5	3·5
VISION	less than 6/60	—	15·9	30·2	26·1	(8·3)	20·3	30·1	26·1

KP = keratic precipitates.

in lepromatous type had ocular findings. Sehgal *et al.*[7] found ocular lesion in 18·7% of tuberculoid and 43·4% of lepromatous type. The difference in these findings may be due to our including all ocular features in the series, even those supposedly not due to leprosy. Weerekoon[8] found eye involvement in 47% of leprosy patients in Ceylon, but he does not mention the types. According to Gupta[9] ocular lesions were seen more frequently with increasing age and duration of the disease.

Table 5 *Incidence of lesions in the posterior segment in different types of leprosy*

	Tuberculoid	*Borderline—borderline*	*Lepromatous*
Vitreous			
Floaters	5	—	4
Opacities	5	—	4
Hazy	3	—	2
Asteroid hyalosis	2	—	1
Total of eyes	15	—	11
Fundus			
Colloid bodies	24	2	11
Opaque nerve fibres	7	—	3
Equat. pigt. deg.	19	—	5
Chorioretinal scar	7	—	2
Retinitis pigmentosa	2	—	—
Naevus	1	—	—
Macular lesion (scar, etc.)	5	—	2
Disc anomaly (tilted, hypoplastic)	2	—	1
Total of eyes	67	2	24

Table 6 *Incidence of blindness in different types of leprosy (visual acuity less than 6/60)*

Cause	*Tuberculoid*	*Borderline—borderline*	*Lepromatous*
Cataract	31	3	31
Amblyopia	1	—	—
Keratokonus	—	—	1
Corneal opacity	4	—	14
Secondary glaucoma	—	—	3
Macular lesion	3	—	1
Optic atrophy	1	—	—
Phthisis bulbi	7	1	4
Retinitis pigmentosa	2	—	—
Aphakia	3	—	2
Acute iridocyclitis	—	—	1
Enucleation already done	2	—	3
Total of eyes	54	4	60
Total of binocular blind patients	14	2	14
Total of monocular blind patients	26	—	32

The number of patients in the group under 20 years of age and the number of patients in the group with duration of disease less than 10 years were too small to be statistically evaluated.

In the group aged 20–40 years in the tuberculoid type only lagophthalmos I (16·7%), lagophthalmos II (11·9%), and fundus abnormality (11·9%) were found in more than 10% of the patients, whereas in the lepromatous group loss of eyebrows (65·9%), loss of eyelashes (27·3%), corneal opacity/vascularity (11·4%), posterior synechiae (36.4%), and vision less than 6/60 (15·9%) were found.

In the groups over 40 years of age both types showed increasing ocular lesions. In the tuberculoid type more than 10% of the patients also showed ocular findings: lagophthalmos III (12·9%), cataract (31·7%), and vision less than 6/60 (18·3%). In the lepromatous type more than 10% of the patients also showed lagophthalmos I (23·0%), lagophthalmos II (10·3%), conjunctivitis (10·3%), cataract (31·7%) and fundus abnormality (15·1%).

Both groups of duration of disease 10–20 years and more than 20 years showed nearly the same figures as the groups of patients aged 20–40 years and more than 40 years except for cataract, which appeared in more than 10% after 10–20 years' duration of the disease (T: 17·6%; L: 18·8%).

Loss of eyebrows was the commonest complication in lepromatous leprosy (T: 5·6%; L: 73·4%). It is a cosmetic problem and a simple guide for other lepromatous complications. *Loss of eyelashes* was more common in lepromatous type (T: 2·1%; L: 38·1%). *Trichiasis* was also found in a smaller percentage (T: 1%; L: 5·8%). This might be due to coincident trachoma, which is equally prevalent in the area. Chatterjee and Chaudhary[10] and Bouzas[11] found trachoma in leprosy patients.

We were surprised to see the distribution of *lagophthalmos* grades I and II as almost equal in both types of leprosy (T: 26·5%; L: 28·3%). Lagophthalmos grade III was observed in a higher percentage of the tuberculoid type (T: 10·1%; L: 4·1%), as has been previously reported.[12]

Pterygium was observed in some of our patients, but it is not a rare disease in the area (T: 2·4%; L: 1·7%). *Conjunctivitis*, as found in the series, was confined mainly to the lepromatous type (T: 3.8%; L: 9·8%) and was due to bacterial infection.[10] There is no true leprous conjunctivitis.[1] *Corneal lesions* could not be classified properly without a slit-lamp, especially the early changes.[13] *Loss of sensation* was observed in 7% of the cases (T: 6·9%; L: 6·4%), as compared with 3% observed by Ticho and Bensira.[12] *The iris* and ciliary body showed a great percentage

of complications in the lepromatous type, the majority of them following chronic plastic iridocyclitis. (T: 7·2%; L: 40·6%)

Cataract is the commonest cause of blindness in Nepal, and it was not surprising to find so many cases in the series (T: 22·9%; L: 24·9%). Some could be due to secondary infection from iritis.[8] *Episcleritis/scleritis*, so often described in lepromatous leprosy associated with keratitis and iridocyclitis,[1] was inconspicuous in our series (T: 0%; L: 1·8%).

The number of *findings in the posterior segment* (Table 5) is too small to form the basis of any conclusion, especially as there has never been any survey of the fundi of the normal population in that area. Ticho and Bensira[12] found no fundal lesion other than nonspecific peripheral changes in the choroid. Weerekoon[14] observed colloid degeneration in the fundus in 0·67%, perhaps not specific of the disease. Schlaegel[15] stated that uveitis is rarely seen in the tuberculoid type of leprosy. Choyce[1] described lesions occurring primarily in the temporal periphery of the fundus as consisting of heaped-up, highly refractive, waxy exudate. His arguments do not appear to be supported by any large series of figures, but he admits that fundus lesions behind the equator of the eyeball are less common.

The *intraocular pressure* was high only in secondary glaucoma (T: 1·4%; L: 3·5%). *Vision less than 6/60* was found in a high percentage (T: 13.9%; L: 26·1%). Out of 466 patients (932 eyes) 12·7% of the eyes were found to be blind (Table 6). Ocular complications supposedly due to leprosy (corneal opacity, phthisis bulbi, secondary glaucoma, enucleation, acute iridocyclitis) were responsible for 40 blind eyes (4·3%).

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