

## EYE DISEASE IN LEPROSY PATIENTS A STUDY IN CENTRAL TANGANYIKA<sup>1</sup>

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### INTRODUCTION

The involvement of the eye in leprosy is one of the most serious complications that can occur. It may arise in one of three ways: (a) by actual invasion of the eye by the leprosy bacillus, (b) as an effect of disease of the 5th or 7th cranial nerve, or (c) from sensitization of the eye to the leprosy process affecting another part of the body. The frequency with which eye complications of leprosy are reported to occur varies enormously in different parts of the world. Quite apart from the possibility of a true difference in incidence, the explanation may partly lie in the variability of other factors. Some of these are the frequency of the different types of the disease, the kind of examination made and the degree of competence with which the eyes are examined, and whether the report was made before or since the beginning of the era of sulfone therapy, and if a recent report the effectiveness of the therapy.

Today if treatment is adequate it can no longer be said, as Pinkerton<sup>(9)</sup> could in 1927, that all leprosy patients sooner or later are affected with ocular complications. The very high incidence of leprosy eye disease reported by earlier workers is no longer encountered in properly-run leprosaria and clinics. Even so, it has been shown by careful slit-lamp studies<sup>(2,3)</sup> that beading of the corneal nerves and limbal infiltration may occur very early in the disease in a high proportion of cases. Although of considerable diagnostic importance these conditions do not give rise to any symptoms, nor do they result in permanent damage, and with the institution of treatment early in the course of the disease they do not progress.

The present study seemed to us to be justified in view of the dearth of detailed accounts of the eye conditions encountered in leprosy patients, and because this aspect of the disease had not previously been

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reported from Tanganyika. At a symposium of the Royal Society of Medicine on leprosy and the eye (<sup>1,6</sup>) a sweeping statement was made to the effect that relatively few leprosy cases in East Africa showed ocular involvement, and that when it did occur the usual appearances consisted of "opaque corneae, shrunken globes, and staphylomata." Such a generalization can hardly be justified for so large and varied an area as East Africa. In this paper details are presented of the incidence and the nature of eye lesions in leprosy patients in Central Tanganyika.

#### NATURE OF THE DATA

One of us (D.S.M.) visited the leprosaria at Kola Ndoto and Makutupora and examined the eyes of all the inmates available at the time—684 at Kola Ndoto (407 males, 277 females), and 528 at Makutupora (321 males, 207 females). The leprosarium at Kola Ndoto, of which one us (M.J.S.) is in charge, is in Shinyanga District of Lake Province and is run by the African Inland Mission, while the one at Makutupora (in the charge of K.R.D.) is in the Manyoni District of Central Province and is under the auspices of the Church Missionary Society. Each of these leprosaria draws the great majority of its patients from the surrounding districts, and may be regarded as containing a fairly representative sample of the severe cases of leprosy in the respective provinces. Kola Ndoto cases come mainly from Shinyanga, Nzega, Maswa, Kwimba, Mwanza and Geita districts, and those at Makutupora from Manyoni, Mpwapwa and Dodoma districts.

Table 1 shows the number of patients examined at each leprosarium, and the relative proportions of the different types of the disease. It will

TABLE 1.—*Frequency (percentages) of various types of leprosy in the two leprosaria concerned.*

Type of disease	Kola Ndoto	Makutupora
Lepromatous		
Not otherwise specified	0.7 %	14.2 %
With turgidity	1.8 %	0.4 %
With macules and nodules	28.2 %	32.3 %
	30.7 %	46.9 %
Tuberculoid		
Not otherwise specified	3.6 %	9.8 %
Minor tuberculoid	49.7 %	21.4 %
Major tuberculoid	12.9 %	6.5 %
	66.2 %	37.7 %
Indeterminate		
Not otherwise specified	0.9 %	11.4 %
With macules	2.2 %	4.0 %
	3.1 %	15.4 %
Polyneuritic lesions	42.9 %	43.0 %

be seen that tuberculoid cases predominate at Kola Ndoto and lepromatous at Makutúpora, while polyneuritic complications are equally frequent at the two places. The difference in the number of indeterminate cases is probably due to a discrepancy in the diagnostic criteria.

With respect to the age distribution, it is evident from Table 2 that it is not the same at the two leprosaria, those at Kola Ndoto tending to be younger.

TABLE 2.—*Age distribution of the patients at the two leprosaria, percentages.*

Age group	Kola Ndoto		Makutupora	
	Males	Females	Males	Females
0-9	14.5	25.0	2.2	4.9
10-19	23.1	15.2	12.4	10.2
20-29	35.9	22.8	13.0	16.1
30-39	14.9	19.6	26.9	18.5
40-49	6.6	10.9	18.9	24.4
50-59	3.9	5.4	18.6	17.1
60-69	0.9	1.1	7.4	8.8
70-79	0.2	—	0.6	—

The duration of treatment with sulfones is shown in Table 3. Relatively few patients at either place have been under treatment for periods exceeding five years. This situation is brought about by the constant pressure for admission from patients urgently needing treatment, rather than by any inability to persuade them to remain long enough.

In Tables 4 and 5 are set out the nature and frequency of the non-

TABLE 3.—*Duration of sulfone treatment at the two leprosaria, percentages by years.*

Years	Kola Ndoto	Makutupora
<1	15.9	23.5
1	20.6	22.0
2	12.7	17.6
3	11.1	10.6
4	13.2	7.6
5	7.0	4.5
6	5.7	4.9
7	3.9	2.7
8	9.5	1.5
9	0.2	0.4
10	0.2	0.6
11	—	0.8
12	—	0.2
13	—	0.8
14	—	1.5
15	—	0.6
19	—	0.2

TABLE 4.—Numbers of nonleprous eye lesions at the two leprosaria.

Lesion	Number of lesions	
	Kola Ndoto	Makutupora
Trachoma		
Herbert's peripheral pits	11	78
Pannus	4	15
Trichiasis	1	16
Pterygium	11	57
Nebula	10	10
Leucoma	4	8
Leucoma adherens	3	6
Phthisis bulbi	3	10
Anterior staphyloma	1	5
Xerosis conjunctivae	1	—
Bitot's spot, lateral	8	10
Bitot's spot, medial	6	2
Keratitis (non-trachomatous)	—	5
Cataract		
Senile, immature	17	15
Senile, mature	3	4
Senile, hypermature	1	—
Anterior polar	2	1
Traumatic	1	1
Episcleritis	—	1
Conjunctival epithelioma	1	—
Corneal ulcer	—	1
Iritis	—	4
Strabismus	3	10
Ptosis	—	2
Nystagmus	1	—
Enucleation	1	—
Sphenoidal sinus tumor?	1	—
Patients affected	87 (12.7%)	203 (38.4 %)

leprous and leprous eye lesions, respectively. It seemed tedious and without profit to present the data so as to show the various combinations of leprous and nonleprous lesions, especially as such associations were purely coincidental. However, the actual numbers of patients affected with the two types of eye lesions have been recorded at the bottoms of the tables.

#### DISCUSSION OF EYE LESIONS

*Nonleprous lesions.*— According to the data in Table 4, nonleprous eye conditions were more than three times as common at Makutupora as at Kola Ndoto. Even when the younger age composition at Kola Ndoto is taken into account, the greater frequency at Makutupora remains. This difference, however, can be entirely explained by the greater prevalence there of two conditions, namely, trachoma and pterygium. Surveys carried out in these two areas (<sup>7</sup>) have shown the

same difference in incidence in the general population. The area from which Kola Ndoto draws most of its patients tends to have a higher rainfall than that around Makutupora, which is semidesert for much of the year. Both trachoma and pterygium tend to occur in dry and dusty parts.

It is interesting to speculate whether malnutrition may play a part in this higher incidence in Central Province, for it is here alone—so far in East Africa—that a serious problem of xerthalmia and keratomalacia has been found to occur (<sup>7</sup>), and there have been repeated times of food shortage there in the past.

This is not the place to comment in detail on the various nonleprous eye lesions, but attention may be drawn to two in particular. Firstly, the high incidence of senile cataract at both places is in accord with the surveys of the general population referred to. While the evidence is still incomplete, it seems probable that the cataract-forming process goes on more rapidly in inhabitants of certain parts of the world, such as Asia and Africa, than it does in people who live in Europe and North America. It is possible that malnutrition in very early life may enhance the development of cataract. Secondly, the occurrence of Bitot's spots in a much higher proportion of the adult population of both lepro-

TABLE 5.—Numbers of leprous eye lesions at the two leprosaria.

Lesion	Number of lesions	
	Kola Ndoto	Makutupora
Conjunctival infiltration	4	—
Episcleritis	1	2
Keratitis, active	13	5
Keratitis, inactive	10	20
Corneal ulcer	1	—
Total leucoma	—	4
Corneal leproma	—	2
Iritis, active	6	1
Iritis, inactive	16	12
Phthisis bulbi	5	4
Anterior staphyloma	3	4
Secondary cataract	3	1
Fundus leproma?	—	2
Lagophthalmos	15	6
Lid destruction	1	—
Blepharochalasis	—	4
Entropion	—	3
Evisceration	—	1
Patients affected		
Lepromatous	35	45
Tuberculoid	16	4
Indeterminate	1	0
Total	52 (7.6 %)	49 (9.3 %)

saria than of the general population of these areas was of considerable interest, and forms the basis of a separate report on the etiology of this lesion (<sup>8</sup>).

*Leprous lesions.*—These conditions, listed in Table 5, contrast markedly in nature, prognosis and incidence with the nonleprous lesions. While some of the commoner nonleprous lesions, such as Herbert's pits, Bitot's spots and the milder degrees of pterygium, were largely innocuous, those indicative of leprous involvement of the eye were all of serious import. Much of the disabling nonleprous eye disease was due to trichiasis, entropion and pterygium, with generally good operative results, while the prognosis of the surgical treatment of leprous ocular lesions is less certain (<sup>1,6</sup>).

It has been seen that the incident of nonleprous eye disease differs considerably in the two places, but this is not the case for leprous lesions (7.6% and 9.3%). This suggests that a partial explanation of the wide variation in the reported incidence of eye lesions in leprosy in different parts of the world may lie in the varying incidence from place to place of nonleprous conditions. Analysis of the data has shown that at both leprosaria, and for both lepromatous and tuberculoid lesions, males are much more commonly affected than females, even after allowing for the fact that about 60 per cent of cases are male.

There are several excellent descriptions of the various eye changes

TABLE 6.—Age and sex distribution of leprous eye lesions.

Type of disease	Age	Number of lesions			
		Kola Ndoto		Maikutupora	
		Male	Female	Male	Female
Lepromatous	0-9	1	—	—	—
	10-19	7	—	1	—
	20-29	7	4	4	1
	30-39	6	3	14	1
	40-49	4	1	8	1
	50-59	—	1	11	3
	60-69	1	—	1	—
Tuberculoid	0-9	—	—	—	—
	10-19	2	1	—	—
	20-29	6	—	—	1
	30-39	3	—	1	—
	40-49	1	1	1	—
	50-59	1	1	1	—
	60-69	—	—	—	—
Indeterminate	40-49	1	—	—	—
Total		40	12	42	7

in leprosy (<sup>2,4,5</sup>). Those observed in the present study followed the usual pattern, but it has seemed worthwhile to picture some of the striking conditions (Fig. 1 to 6).

Relatively few cases of active ocular leprosy were seen, and it was evident that the grosser destructive changes had occurred either before the patient came under supervision or as a result of lepra reaction. Only one case with miliary lepromata on the iris was encountered, although these changes were looked for carefully, and this highly characteristic lesion seems to be less common here than usual. Several cases had secondary glaucoma, but the infrequency of this condition may be due—as has been suggested by Prendergast (<sup>10</sup>), to atrophy and hyalinization of the ciliary body processes. Under the slit lamp, clearly visible corneal nerves were noted in many cases, but actual beading of the nerves was not so common. In the experience of one of us (D.S.M.) quite thick, but nonbeaded, corneal nerves are frequently seen in Africans without ocular disease. Finally, two cases of possible retinal lepromata were seen. They closely resembled the lesions pictured by Elliott (<sup>2</sup>) and by Somerset and Sen (<sup>11</sup>), but their precise etiology could of course not be determined.

#### SUMMARY

The ocular complications of leprosy, although seen less frequently now than before an effective treatment was available, are sufficiently serious to merit further study. In Central Tanganyika, an analysis has been made of the nature and the incidence of both leprosy and non-leprosy eye lesions in more than 1,200 leprosy patients. Approximately 10 per cent had leprosy involvement of the eye in each of the two leproseries where the study was carried out. The nonleprosy lesions were three times more frequent at Makutupora (38.4%) than at Kola Ndoto (12.7%), the difference being almost entirely accounted for by the much higher prevalence of pterygium and trachoma in the dry, dusty country around Makutupora. It is possible that malnutrition may also play a part, for it is in the latter area that other work has shown a severe deficiency of vitamin A to be responsible for blindness due to keratomalacia in young children.

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#### DESCRIPTION OF PLATE

FIG. 1. Severe lepromatous leprosy in a boy aged 13, with corneal leproma (left) and leucoma adherens (right).

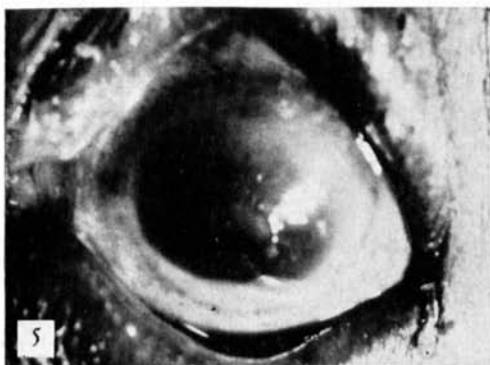
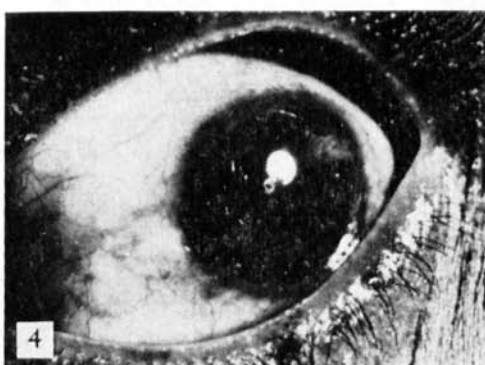
FIG. 2. Blepharochalasis (right) and healed keratitis (left) in a lepromatous male aged 64.

FIG. 3. Healed pannus and superficial punctate keratitis in a woman aged 21 with lepromatous leprosy.

FIG. 4. Marked atrophy of the iris with cornea little affected, in a male aged 38 with indeterminate leprosy.

FIG. 5. Gross healed keratitis, and iridocyclitis with distorted pupil and rents in the iris, in a man aged 50 with long-standing lepromatous disease.

FIG. 6. Conglomerate of iris pearls free in the anterior chamber of a man aged 20 with severe lepromatous leprosy.



## RESUMEN

Aunque observadas hoy día menos frecuentemente que antes de contarse con un tratamiento eficaz, las complicaciones oculares de la lepra son suficientemente graves para merecer nuevos estudios. En la Tanganica Central, se verificó un análisis de la naturaleza y la incidencia de las lesiones oculares tanto leprosas como no leprosas en más de 1,200 leprosos. Aproximadamente 10 por ciento tenían invasión leprosa del ojo en los dos leprosarios en que se llevó a cabo el estudio. Las lesiones no leprosas fueron tres veces más frecuentes en Makutupora (38.4 por ciento) que en Kola Ndoto (12.7 por ciento), debiéndose la diferencia casi por completo a la incidencia mucho más alta de pterigión y tracoma en la región polvorienta y árida alrededor de Makutupora. Es posible que la desnutrición también desempeñe algún papel, pues es en última zona que otros estudios han revelado que una intensa deficiencia de vitamina A es la causa de la ceguera debida a queratomalacia en los niños pequeños.

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