OCULAR TOXOPLASMOSIS AMONG NEGRO IMMIGRANTS IN LONDON*†

BY

J. R. CHESTERTON AND E. S. PERKINS

Department of Experimental Ophthalmology, Institute of Ophthalmology, University of London

SINCE the influx of immigrants to Great Britain from West Africa and the West Indies, it has been our impression that toxoplasmic chorioretinitis is more common among people from these countries than among the indigenous population, and that the lesions in the immigrants are more frequently situated in the periphery of the fundus.

Toxoplasmosis is widely distributed throughout the world; but there is serological evidence that the frequency of infection varies considerably in different areas. Feldman (1961) has suggested that the incidence may be less in cold climates than in temperate and tropical regions. Population surveys using the dye test have shown some surprising variations; for example, 4 per cent. positive in the Navajo Indians of Arizona, 17 to 35 per cent. in various cities in the U.S.A., 68 per cent. among people living in Tahiti (Feldman and Miller, 1956); 78.9 per cent. among 259 islanders from Tristan da Cunha (Thracker, 1963); and Darrell, Pieper, Kurland, and Jacobs (1964) in an epidemiological study on a South Sea island found a positive dye test in 90 per cent. of the population over 20 years of age.

That human toxoplasmosis might be widely endemic in West Africa was suggested by Walters (1957), and this is supported by case reports of probable toxoplasmic infection (Jelliffe, 1951; Middlemiss, 1957; de Jongh and de Jager, 1959; Ffrench, 1962a). As yet no large serological surveys have been carried out in West Africa, but Ffrench (1962b) reported positive dye tests in 50 per cent. of 63 selected cases of uveitis in Ghana, the test being positive in 59 per cent. of 34 with posterior lesions. Iverson, Hursh, and Lewis (1960) found 88 per cent. of seventeen cases of chorioretinitis from Northern Nigeria to have a positive dye test.

The results of several serological studies have been reported from the West Indies. The frequency of positive dye tests was 32.4 per cent. (Thiermann, Naquira, and Niedmann, 1958) and 33 per cent. (Cardelle, Curbelo, and Diaz Carral, 1959) in Havana; 36 per cent. in Haiti; and 54.5 per cent. among natives of Trinidad (Lunde and Jacobs, 1958).

Methods and Material

In the present study the histories of patients referred to the Uveitis Clinic at the Institute of Ophthalmology, London, between 1960 and 1965, were reviewed with particular reference

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† Address for reprints: Institute of Ophthalmology, Judd Street, London, W.C.1.

to the incidence of toxoplasmosis in Negro immigrants and the occurrence of peripherally-situated chorioretinal lesions. The criteria for the diagnosis of toxoplasmic uveitis were:

- (i) The history of poor vision in one or both eyes or of intermittent visual disturbances suggestive of previous episodes of posterior uveitis;
- (ii) The ophthalmoscopic appearance of the chorioretinal lesion, characteristically focal with frequent evidence of previous inflammation in the vicinity;
- (iii) A positive dye test;
- (iv) In some cases the response to treatment with pyrimethamine;
- (v) The exclusion of other conditions.

Apart from the dye test, investigations included white blood cell count, haemoglobin, erythrocyte sedimentation rate, Wassermann reaction, Mantoux test, and chest X ray; and in Negro patients examination for sickle-cell trait. Cases in which an alternative aetiology could be considered, for example those with a positive Wassermann reaction, were excluded from this series.

The cases were divided into two groups, posterior and peripheral, on the basis of the site of the main chorioretinal lesions. The posterior group included patients with lesions along the main vessels, at the macula, or near the disc; peripheral lesions were those at the equator or further forwards.

Results

950 histories were analysed (Table I). 844 were Caucasian, 74 were Negroes, and the remaining 32 were Asiatic or from other racial groups. In 79 (8.3 per cent.) of the whole series the uveitis was considered to be due to toxoplasmosis, but 27 of these 79 (34.2 per cent.) were Negroes and there were no Asians. Toxoplasmosis accounted for only 6.2 per cent. of all cases of uveitis in Caucasians but 36.5 per cent. in Negroes. This difference is highly significant ($\chi^2 = 74$; $P < 0.01$).

TABLE I
INCIDENCE OF TOXOPLASMIC UVEITIS IN DIFFERENT RACIAL GROUPS

Diagnosis		Uveitis	Toxoplasmosis	
			No.	Per cent.
Race	All Races	950	79	8.3
	Caucasians	844	52	6.2
	Negroes	74	27	36.5
	Asiatic and Other Races	32	—	—

Table II shows the incidence of toxoplasmic uveitis in West Indian and West African patients; the higher incidence in West Africans is not significant.

TABLE II
INCIDENCE OF TOXOPLASMIC UVEITIS IN NEGRO PATIENTS

Diagnosis		Uveitis	Toxoplasmosis	
			No.	Per cent.
Place of Origin	West Indies	43	12	27.9
	West Africa	30	14	46.7
	Other (Mauritius)	1	1	—

A comparison of the height of the dye test titres in Caucasians and Negroes with toxoplasmic uveitis shows that the latter have a higher proportion of dye test titres over 1 : 64 ($\chi^2 = 6.1$; $P < 0.02$) (Table III).

Peripherally-situated lesions were found more commonly in Negro patients—25.9 per cent., compared with 3.8 per cent. of Caucasians ($\chi^2 = 6.3$; $P < 0.02$). The peripheral lesions were always accompanied by an aqueous flare, cells, and keratic precipitates, but in about one-quarter of the group with posterior lesions signs of activity in the anterior chamber were minimal or absent.

TABLE III
POSITIVE DYE TEST TITRES IN CASES OF
TOXOPLASMOSIS, BY RACE

Dye Test Titre	Race	
	Caucasian	Negro
1 : 8 to 1 : 64	36	8
Over 1 : 64	16	19

It was impossible to determine accurately the age at which symptoms had first been noticed, but there was no significant difference in mean age at the time of examination between the Negro and Caucasian patients (mean 26.2 and 25.5 years respectively). The sex incidence was approximately equal among Caucasian patients but there was a predominance of men among the Negroes. This predominance was probably due to the higher male : female ratio of the immigrant population (General Register Office, 1963).

Discussion

According to the 1961 Census, 2.5 per cent. of the population of London were immigrants from West Africa and the West Indies. This figure may have risen since then and the fact that 7.8 per cent. of all patients with uveitis referred to the Institute of Ophthalmology were immigrants may not be significant. The high proportion of cases of toxoplasmic uveitis among immigrants is however significant, and contrasts with the experience in California (Hogan, Kimura, and O'Connor, 1964). They found that, although 10 per cent. of 240 cases of uveitis occurred in Negroes, ocular toxoplasmosis was uncommon. Fair (1958), however, reported 29 cases of congenital toxoplasmic chorioretinitis from Georgia, 21 per cent. in Negroes.

It is probable that the incidence of toxoplasmosis in a population depends more on geographical than on racial factors. Immigrants to Great Britain from the West Indies outnumber those from West Africa by 7.8 : 1 and yet there were more cases of toxoplasmosis among the West Africans than among the West Indians (Table II). This suggests that toxoplasmosis is more common in West Africa than in the West Indies.

Even in immigrants with uveitis not considered to be toxoplasmic in origin, the dye test was positive in 89 per cent., suggesting that the incidence of toxoplasmic

infection is high in their countries of origin. Toxoplasmosis was not considered to be the cause of the uveitis in any of the 32 Asian immigrants, who came mostly from India and Pakistan.

The higher dye test titres found in the immigrants suggest that they had been more heavily or more recently infected. None of the cases of toxoplasmic chorioretinitis in this series gave a history of systemic disturbance compatible with an acquired toxoplasmic infection and scars of previous lesions were apparent in almost all eyes. If, as we believe, the vast majority of cases of toxoplasmic uveitis are recurrences of congenital infection, the higher dye test titres in the immigrants are probably due to a more severe infection or an infection with a more virulent strain of the organism.

Binkhorst (1948) recognized the variability of toxoplasmic chorioretinal lesions not only in size and number but in situation, varying from the posterior region of the fundus to the extreme periphery. Fair (1961) observed that central lesions were often accompanied by large or small lesions in the periphery, with the subsequent formation of chorioretinal scars characteristic of toxoplasmosis; furthermore, he regarded such peripheral lesions as a not uncommon finding either on routine examination or after a recurrence of inflammation. In a series of 240 cases of probable ocular toxoplasmosis, Hogan and others (1964) demonstrated a high incidence of equatorial or more peripheral lesions, which accounted for nearly half the lesions found. Compared with these American series, the finding of relatively few peripheral lesions among Caucasians in the present study may seem surprising; however, most European investigators have regarded the posterior pole as the preferred location for the chorioretinal lesions of toxoplasmosis (Tolentino and Bucalossi, 1954; Thalhammer, 1957; Perkins, 1961; Remky, 1962; François, 1963; Bartorelli, Berengo, Bencini, and Frezzotti, 1964).

The higher incidence of peripheral lesions among Negro immigrants in London is statistically significant, but is difficult to explain. The lesions were otherwise typical of toxoplasmosis and no other likely cause was discovered. Investigations were performed to exclude active pulmonary tuberculosis, sarcoidosis, and syphilis, and, especially with regard to peripheral lesions, the retinopathy of sickle-cell disease; the fundus changes in this condition are mainly confined to the periphery of the fundus, and are sometimes associated with vitreous haemorrhage and uveitis (Monro and Walker, 1960).

This point is best illustrated by the case of a 29-year-old Nigerian, not included in the toxoplasmosis group in this series. When seen in the Uveitis Clinic he gave a 2-week history of a red painful right eye. The ophthalmoscopic findings were suggestive of toxoplasmosis: an area of active choroiditis with an adjacent pigment clump along the inferior nasal vessels, which showed perivascular changes extending to the periphery; marked keratic precipitates, aqueous flare, and cells in the anterior chamber; the dye test was positive 1:64. No improvement followed a one-month course of pyrimethamine. The sickle-cell test was positive; haemoglobins A and S were shown on electrophoresis. Subsequently, after the development of secondary glaucoma, the eye was enucleated and the pathological findings were those of haemorrhagic glaucoma. The left eye remained normal. It is possible that in this patient a reactivation of a focus of toxoplasmosis induced the secondary vascular changes typical of sickle-cell disease.

The more frequent occurrence of keratic precipitates, aqueous flare and cells in the anterior chamber in association with peripheral chorioretinal lesions may be

due to the anatomical proximity of these lesions to the ciliary body and anterior segment; features of permanent damage, such as posterior synechiae, were not recorded.

In view of the frequency of toxoplasmic chorioretinitis among Negro immigrants, it would be of considerable interest to determine whether a similar high incidence is to be found among the indigenous population in their countries of origin. It is possible that had these patients remained in their own countries they would not have suffered a recurrence. The factors which precipitate recurrences of toxoplasmic chorioretinitis are largely unknown, and it may be that the stresses (climatic and other) that emigration involves are responsible for the breakdown of congenital lesions. Until figures are available for the relapse rate among the population from which the immigrants came, such reasoning must remain conjectural.

Summary

Of 950 patients attending the Uveitis Clinic at the Institute of Ophthalmology, London, 79 were diagnosed as having ocular toxoplasmosis. Of these 79, 27 were Negro immigrants (34.2 per cent.); this was a much higher incidence than could be expected on a population basis. Negro patients with toxoplasmosis showed significantly higher dye test titres than Caucasian patients. A relatively high incidence of ocular toxoplasmosis was noted in Negro immigrants from West Africa.

Peripheral chorioretinal lesions due to toxoplasmosis were found to be significantly more common among Negroes than among Caucasians.

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