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Australia (Au (1)) Antigen in Nigerian Patients with Leprosy[1]

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Several reports have shown that the prevalence of Australia (Au[1]) antigen in the normal population is low in the U.S.A. and Scandinavia where it occurs in about 0.1% of the population but high in several tropical and subtropical countries where 4% to 20% of the population may be "carriers" ([10, 16]). This antigen appears to be closely associated with, if not identical to, at least one of the hepatitis viruses ([1, 2, 6, 15]). The antigen has been found in higher frequency in patients with lepromatous leprosy than in the general population in the Philippines and South India ([7, 8]). However, among 218 Brazilian patients (200 of whom were Caucasoid and 18 Negroid), 80% of whom had lepromatous leprosy, the prevalence of the antigen was the same as in the general population ([17]). Leprosy is not an uncommon disease in West Africa where over half a million people are estimated to be suffering from some degree of deformity or disability due to the disease ([11]). This study therefore set out to determine the prevalence and other associated features of Australia antigen in Nigerian patients with leprosy.

MATERIALS AND METHODS

Sixty-four patients, all residents of a leprosarium in Abeokuta, about 50 miles southwest of Ibadan, constituted the study population. They had all lived as a close community in the leprosarium and rehabilitative center from three months to 20 years. Histories were taken from each patient, particular note being taken of the duration of illness, stay in the leprosarium, history of previous jaundice and chronic alcoholism. Clinical examination provided the means of classification of the different types of leprosy, presence of jaundice, hepatomegaly or other system abnormalities.

Clotted blood was drawn from each patient and the serum separated within three hours of collection. Screening of the sera for Au (1) antigen and antibody was done by electrophoretic immuno-precipitation in agar/agarose mixture (electrosyneresis) according to the methods of Bedariga *et al* ([3]) and Pesendorfter *et al* ([14]). The positive sera were tested for identity with reference reagents (Au [1] and its antibody) obtained from several laboratories. These included Dr. A. Nowalaski (Poland), Dr. K. Okochi (Japan), Dr. A. J. Zuckerman (London) and Drs. S. Cunningham and B. S. Blumberg (U.S.A.).

A battery of liver function tests as well as the blood groups and hemoglobin genotype by electrophoresis were determined for all the samples.

RESULTS

The sixty-four patients studied consisted of 31 males and 33 females whose ages ranged from 13 to 80 years. Nine males and seven females admitted to ingestion of up to four pints weekly of palm wine, a local, naturally occurring fermented alcoholic beverage obtained from the palm tree (*Elaesis guineensis*) and containing up to 3.2% alcohol ([12]). No epidemics of jaundice had been recorded over the last 20 year history of the leprosarium and no sporadic cases had occurred in the past five years.

Four (11.8%) of the 34 patients with lepromatous leprosy had Au (1) antigen in their sera. None of the 30 patients with tuberculoid leprosy had Au (1) in the serum. As shown in Table 1, three of the patients with Au (1) antigen in their blood were females aged 22, 35 and 40 years respectively and the only positive male was aged 60. The 22 year old female was about seven months pregnant.

Leprosy had been present from 5 to 15

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TABLE 1. *Age, sex, distribution and disease type in 64 leprosy patients.*

Sex	Patients studied	Age						
		11–20	21–30	31–40	41–50	51–60	61–70	70+
Males	Lepromatous leprosy	1	2	4	7	4	1	–
	No. with Au (1)	–	–	–	–	1	–	–
	Tuberculoid leprosy	1	2	2	4	2	1	–
	No. with Au (1)	–	–	–	–	–	–	–
Females	Lepromatous leprosy	–	1	3	3	3	3	2
	No. with Au (1)	–	1	2	–	–	–	–
	Tuberculoid leprosy	1	2	4	4	4	2	1
	No. with Au (1)	–	–	–	–	–	–	–

years in the females and 30 years in the only positive male patient at the time this study was carried out (Table 2).

The female patients with Au (1) antigenemia had spent between three months to five years and the male patient 20 years in the leprosarium (Table 3). There was no difference between the tuberculoid and lepromatous leprosy patients as well as Au (1) positive and negative patients as regards to liver function tests, blood groups and hemolglobin genotypes.

DISCUSSION

Prince (15) reported a prevalence rate of 19% for Au (1) antigen from 90 sera collected in Katsina, a town in the North Western State and inhabited predominantly by Hausa-speaking Nigerians. Smith *et al* ([19]) observed a prevalence of 5.1% from

TABLE 2. *Duration of leprosy as related to Au (1) antibody.*

Sex	Patients studied	Duration of disease in years						
		1–5	6–10	11–15	16–20	21–25	26–30	30+
Males	Lepromatous leprosy	2	7	3	2	1	3	1
	No. with Au (1)	–	–	–	–	–	1	–
	Tuberculoid leprosy	2	3	4	2	–	1	–
	No. with Au (1)	–	–	–	–	–	–	–
Females	Lepromatous leprosy	4	4	6	–	–	1	–
	No. with Au (1)	1	1	1	–	–	–	–
	Tuberculoid leprosy	1	13	2	1	1	–	–
	No. with Au (1)	–	–	–	–	–	–	–

TABLE 3. *Duration of stay in leprosarium in years, sex, type of lesion and presence of Au (1).*

Sex	Patients studied	Duration of stay in leprosarium in years			
		0–5	6–10	11–15	16–20
Males	Lepromatous	7	7	3	2
	No. with Au (1)	–	–	–	1
	Tuberculoid	4	8	–	–
	No. with Au (1)	–	–	–	–
Females	Lepromatous	6	8	1	1
	No. with Au (1)	3	–	–	–
	Tuberculoid	8	9	–	–
	No. with Au (1)	–	–	–	–

2,045 apparently healthy predominantly Yoruba-speaking Nigerian blood donors in Ibadan, a town in the west, 50 miles northeast of Abeokuta and 450 miles southwest of Katsina. The finding of a prevalence rate of 11.8% in (4 of 34) institutionalized Nigerian patients with lepromatous leprosy and none of 30 patients with tuberculoid leprosy confirms the studies of Blumberg *et al* [7, 8]. As has been shown by studies of Au (1) antigen in leprosy patients from the Philippines, South India, Singapore, Hong Kong, Australian aborigines, Greece, Italy and Brazil [7], an increased prevalence in lepromatous leprosy is not found in areas where the antigen is not common in the general population.

Lepromatous leprosy is one of a group of chronic diseases including chronic leukemia, Down's syndrome, and chronic renal disease with hemodialysis treatment where a prolonged and usually severe impairment of the immune mechanism occurs, particularly a diminution of delayed type hypersensitivity [4, 5, 6, 9, 13, 21]. In patients with Down's syndrome, it has been shown that Au (1) is associated with chronic anicteric hepatitis especially in institutionalized patients [20].

However, Au (1) was not found in the sera of patients with sarcoidosis [18], a disease in which there is also considerable impairment of delayed type hypersensitivity. Yap *et al* [72] found an incidence of 10% in both types of leprosy as compared with 3% in blood donors in Singapore using the electro-osmodiffusion (electrosyneresis) technic.

It has been suggested that the higher prevalence of Au (1) in lepromatous leprosy in some places, like the Philippines, may be due to the fact that lepromatous cases were more likely to be confirmed to residential institutions than tuberculoid patients who are often treated as outpatients. Coincidental anicteric hepatitis could thus account for the higher prevalence of Au (1) in such communities. This study in which both tuberculoid and lepromatous patients were treated in an institution does not support this view.

Blumberg *et al* [8] found in their Cebu study that males had a higher prevalence of Au (1) than females and that the frequency in males decreased with age. Smith *et al* [19] found the greatest frequency of Au (1) in male blood donor in Ibadan to be in the 20-29 year age group. Probably because of the small number of leprosy patients in this decade, the bulge expected in Au (1) antigenemia was obscured in the present study. It was, however, observed

that Au (1) prevalence rate in young females was higher than in young males or older females.

SUMMARY

Australia antigen was detected by electrosyneresis in four of 34 patients (11.8%) with lepromatous leprosy but in none of 30 patients with tuberculoid leprosy in the same leprosarium. The prevalence of Au (1) in normal blood donors in Ibadan, a town 50 miles northeast of the leprosarium, was 5.1% by the same technic. Three of the patients with Au (1) were young females and the fourth patient was an elderly male. The Au (1) positive females had been in the leprosarium for less than five years whereas the male had been there for 18 years. There was no correlation between the duration of the disease, history of alcoholism or previous jaundice, liver function tests, hemoglobin genotype, blood group, and the presence of Au (1) in the serum.

RESUMEN

Utilizando el método de electrosineresis se detectó antígeno Australia en cuatro de 34 pacientes (11,8%) con lepra lepromatosa, pero en ninguno de 30 pacientes con lepra tuberculoide en el mismo leprosario. Utilizando la misma técnica, la prevalencia de Au (1) en donantes de sangre normales en Ibadan, una ciudad que queda a 50 millas al noroeste del leprosario, fué de 5,1%. Tres de los pacientes con Au (1) fueron mujeres jóvenes y el cuarto fué un hombre anciano. Las mujeres Au (1) positivas habían estado en el leprosario durante menos de cinco años, mientras que el hombre había estado durante 18 años. No hubo correlación entre la duración de la enfermedad, historia de alcoholismo o ictericia previa, pruebas de funcionamiento hepático, genotipo hemoglobínico, grupo sanguíneo y la presencia de Au (1) en el suero.

RÉSUMÉ

L'antigène australien a été décelé par électrosynérèse ches quatre malades sur 34 atteints de lèpre lépromateuse (11,8 pour cent), et chez aucun des 30 malades souffrant de lèpre tuberculoïde et résidant dans la même léproserie. La prévalence de Au (1) chez des donneurs de sang normaux à Ibadan, ville située à 50 miles au nord-est de la léproserie, s'élevait à 5,1 pour cent, par la même technique. Trois des malades positifs pour Au (1) étaient des femmes jeunes, et le quatrième était un homme plus âgé. Les femmes positives pour Au (1) avaient résidé à la léproserie pendant moins de cinq ans; l'homme y avait séjourné durant 18 ans. On n'a observé aucune corrélation entre la durée de la maladie, des antécédents alcooliques ou de jaunisse antérieure, les épreuves de la fonction hépatique, le génotype pour l'hémoglobine, et les groupes sanguins, d'une part, et la présence d'Au (1) dans le sérum d'autre part.

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