

# A PROSPECTIVE STUDY OF INSULIN-DEPENDENT DIABETIC NIGERIAN AFRICANS

Andrew F. Bella, MRCP(UK), FWACP  
Ibadan, Nigeria

**Newly diagnosed insulin-dependent diabetic Nigerian Africans were studied prospectively over a 6-year period and were analyzed for sex, age at diagnosis, and month of onset of symptoms. Insulin-dependent diabetes mellitus (IDDM) rarely occurred in patients younger than the age of 10. A female preponderance occurred in those aged 20 and younger, and a male preponderance occurred in those aged 20 and older. The onset of symptoms occurred predominantly in the dry months of the year (October to March), peaking in February.**

**The educational level and current employment status of the patients were compared with age- and sex-matched controls. The diabetics were found to have significantly less education, and approximately one third (34.9%) were unemployed compared with 10% of the controls. Control of the disease was found to be poor in three fourths of the patients. Various factors that prevent young diabetics in developing countries from living a full life are discussed. (*J Natl Med Assoc.* 1992;84:126-128.)**

**Key words** • insulin-dependent diabetes mellitus • Nigerian Africans

Insulin-dependent diabetes mellitus (IDDM) occurs less frequently in blacks than in whites.<sup>1</sup> Reasons for this are that blacks have a lower prevalence of human leukocyte antigens (HLA) D3 and D4<sup>2</sup> as well as islet cell

antibodies and other autoantibodies.<sup>3</sup> An additional factor may be that young African insulin-dependent diabetics die young because they do not have educational and employment opportunities comparable to those of their nondiabetic age groups. Consequently, many of these patients do not possess adequate money to purchase insulin to keep themselves alive for a long time after diagnosis of diabetes. Because insulin is not supplied free of cost in most African countries, insulin-dependent diabetics have high morbidity and mortality rates. This study assesses the presenting pattern, the educational levels, and current employment status of young Nigerian diabetics. The educational level and employment status were compared with those of nondiabetic patients to determine whether there were any significant differences.

## MATERIALS AND METHODS

The patients were consecutive insulin-dependent, ketosis-prone diabetics seen over a period of six years (1983 to 1988) at the University College Hospital, Ibadan, Nigeria. During this period, 643 noninsulin and 57 insulin-dependent new diabetic patients were seen. The insulin-dependent diabetics comprised 27 males and 30 females with a mean age  $\pm$  standard deviation of  $20.4 \pm 8.3$  (range: 5 to 34 years). The diagnosis of insulin-dependent diabetes was made if the fasting blood glucose was  $\geq 120$  mg/dL or if the 2-hour postprandial glucose value was  $\geq 180$  mg/dL, if the age of onset was  $< 40$  years, and if the patient was prone to ketosis. Islet cell antibodies and HLA antigens were not investigated in these patients. One patient with features suggestive of malnutrition-related diabetes was excluded from the study.

The month of onset of symptoms was recorded in 50 patients who presented at the hospital within 3 months of developing diabetes. Control of diabetes was assessed by the mean of at least 12 postprandial blood

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From the Department of Medicine, University College Hospital, Ibadan, Nigeria. Requests for reprints should be addressed to Dr Andrew F. Bella, Dept of Medicine, University College Hospital, Ibadan, Nigeria.

TABLE 1. PATIENT CHARACTERISTICS

| Characteristic             | Insulin-Dependent Diabetics |                |
|----------------------------|-----------------------------|----------------|
|                            | Insulin-Dependent Diabetics | Nondiabetics   |
| Mean age in years (range)  | 20.4 (5 to 34)              | 21.8 (6 to 40) |
| Sex (male to female ratio) | .9:1                        | .9:1           |
| Socioeconomic status (%)   |                             |                |
| Upper social class         | 9.3                         | 10             |
| Middle social class        | 41.9                        | 38             |
| Low social class           | 48.8                        | 52.0           |

glucose values during the study period (routine glycosylated hemoglobin monitoring was not available). The patients were age- and sex-matched with 100 nondiabetic patients of similar socioeconomic class who were attending school in the same locality. Patients' socioeconomic class was based on their educational level and occupation, and the average income of their parents. Current employment was assessed in those who finished or discontinued schooling.

The Student's *t*-test was used to determine significance (*P* value of <.05).

## RESULTS

The characteristics of the patients and controls are shown in Table 1. Table 2 shows the age of onset and sex of the patients. For patients younger than the age of 20, there was a female preponderance (male to female ratio of 1:2.3). For patients older than the age of 20, there was a male preponderance (male to female ratio of 1.7:1). Table 3 shows the months of onset of symptoms. Approximately 84% of patients presented between the months of October and March; the highest number of patients developed symptoms during the month of February. Table 4 shows the educational level and employment status of the patients and controls. The insulin-dependent diabetics had significantly less education than the nondiabetic patients (*P*<.001).

A significant smaller proportion of the insulin-dependent diabetics had skilled jobs (*P*<.001), and a significant higher proportion were unemployed (*P*<.001). The mean postprandial blood glucose was <200 mg/dL in 26.2% of the patients and >200 mg/dL in 74.8%.

## DISCUSSION

Insulin-dependent diabetes mellitus accounted for

TABLE 2. AGE AT DIAGNOSIS AND SEX OF INSULIN-DEPENDENT DIABETICS

| Age of Onset | Males     | Females   |
|--------------|-----------|-----------|
| 0 to 4       | 0         | 0         |
| 5 to 9       | 2         | 4         |
| 10 to 14     | 5         | 12        |
| 15 to 19     | 1         | 3         |
| 20 to 24     | 4         | 4         |
| 25 to 29     | 9         | 1         |
| 30 to 34     | 6         | 6         |
| 35 to 40     | 0         | 0         |
| <b>Total</b> | <b>27</b> | <b>30</b> |

TABLE 3. MONTH OF ONSET OF SYMPTOMS OF DIABETES MELLITUS

| Month                 | No. of Patients |
|-----------------------|-----------------|
| January thru March    | 25              |
| April thru June       | 3               |
| July thru September   | 5               |
| October thru December | 17              |
| <b>Total</b>          | <b>50</b>       |

approximately 8.9% of all types of diabetes seen in this study, indicating that IDDM is uncommon in Nigerians. The female preponderance in patients younger than 20 years old and a male preponderance in patients older than 20 years of age appears to suggest that there may be two heterogeneous groups. In whites, the HLA-B8/DR3 and HLA-B15/DR4 haplotypes have been observed to be responsible for two different types of diabetes in IDDM.<sup>4,5</sup> The HLA-B8/DR3 has been thought to be an autoimmune disorder characterized by the presence of pancreatic islet cell antibodies, onset at any age, a higher incidence in females, and an association with other autoimmune endocrinopathies, while the HLA-B15/DR4 is presumed to be viral in etiology and characterized by high titers of anti-insulin antibodies.<sup>4,5</sup>

A 1982 study showing the absence of HLA-B8 in Nigerian diabetics<sup>6</sup> supports the rarity of islet cell antibodies in Nigerian diabetes that was reported earlier by Oli and coworkers.<sup>3</sup> Associated autoimmune endocrinopathies have also been found to be rare in IDDM in Nigerians. In a review of 120 registered patients with IDDM at the University College Hospital, Ibadan Nigeria, only four of these patients had other endocrinopathies, two had thyrotoxicosis, one had hypothyroidism, and the last had myasthenia gravis (Bella AF.

TABLE 4. PATIENTS' EDUCATIONAL LEVEL AND EMPLOYMENT STATUS

|                                       | % of Patients               |              | P Value |
|---------------------------------------|-----------------------------|--------------|---------|
|                                       | Insulin-Dependent Diabetics | Nondiabetics |         |
| <b>Educational Level</b>              |                             |              |         |
| Completed primary education           | 74.4                        | 100          | <.001   |
| Completed secondary education         | 18.6                        | 60           | <.001   |
| Attending polytechnic/university      | 4.7                         | 23           | <.001   |
| Graduated from polytechnic/university | 2.3                         | 6            | >.1     |
| <b>Employment Status</b>              |                             |              |         |
| Nonskilled                            | 46.5                        | 40           | >.1     |
| Skilled                               | 18.6                        | 50           | <.001   |
| Unemployed                            | 34.9                        | 10           | <.001   |

Unpublished data). Another study found HLA/DR4 in five of six Nigerian insulin-dependent diabetics who were under the age of 20 at the onset of the disease.<sup>2</sup> This would suggest that viral cause may be more important than autoimmunity in Nigerian insulin-dependent diabetics. The onset of IDDM symptoms during the dry and hot months of the year when upper respiratory tract infections are common also suggests that viruses may play an important role in the development of IDDM in Nigerians. Although no direct relation has yet been established, similar findings have been noted in whites where the onset of IDDM is most prevalent during the winter months when the transmission of viral infections is common.<sup>7,8</sup>

Results show that with the same socioeconomic background, insulin-dependent diabetics had lower educational levels than nondiabetic patients and were more likely to be unemployed. Because the two groups of patients were from the same locality and attended similar schools, one would expect that there should not be any significant difference if similar health facilities were extended to both groups. The inability to attain higher educational levels precluded the insulin-dependent diabetics from obtaining jobs with salaries adequate enough to purchase insulin that would sustain their lives. The significance of this economic hardship experienced by young insulin-dependent diabetics in developing countries can be appreciated when it is realized that in Nigeria and some other African countries, insulin is not supplied free of charge to diabetic patients. The drug is consequently purchased at exorbitant prices. This situation is worsened by the irregular supply of insulin to African countries.

The reasons for the lower educational level of insulin-dependent diabetics are partly a result of the

suboptimal health care these individuals receive. This suboptimal health care arises from the undersupply and the high cost of insulin. The reagents for monitoring the degree of control of diabetes are also inadequate. Less than a third of the diabetic patients in this study were optimally controlled. Poor control of diabetes leads to frequent admissions into hospitals, which results in less attendance at school. One can conclude that young Nigerian African diabetics are a disadvantaged group in need of urgent diabetic relief measures such as a regular supply of insulin and inexpensive syringes and needles. Such measures are needed to improve the quality of lives of Nigerian insulin-dependent diabetics and to help them live longer.

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