Prevalence and Clinical Picture of IDDM in Nigerian Igbo Schoolchildren

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OBJECTIVE — To evaluate the prevalence and clinical picture of IDDM in Nigerian Igbo schoolchildren born and living in continental Africa.

RESEARCH DESIGN AND METHODS — In three school districts (Ezza, Ishielu, Ohaukwu), 77,862 schoolchildren aged 5–17 yr answered our questionnaires on age, sex, known disease, drugs being taken, family history, and diabetic symptoms like polyuria, polydipsia, polyphagia, and weight loss. Positive respondents were given glucosuric tests, and glucosuric subjects had hyperglycemic tests. Diagnosis of IDDM was established in hyperglycemic patients by referred hospital clinicians based on insulin requirements.

RESULTS — Twelve new cases of IDDM were found in addition to 14 previously diagnosed cases, giving a CPR of 0.33/1000. Ishielu had a CPR of 0.46/1000 compared with 0.25 ($P < 0.01$) for Ohaukwu. Boys had a CPR of 0.38/1000 compared with 0.25/1000 ($P < 0.06$) for girls. Boy-to-girl prevalence ratio was ~3:1.

CONCLUSIONS — The relatively high prevalence of IDDM in this poor African population, despite potential deaths caused by minimal medical attention, may be because of long-term protein malnutrition and endemic childhood infections, which have been implicated in the etiology of IDDM in similar malnourished populations.

The incidence and prevalence of IDDM is now well documented in many parts of the world (1). A few epidemiological studies even have been conducted in developing countries, including some in Africa (2,3), but little is known of the epidemiology of IDDM in Nigerian Africans. These studies on incidence and prevalence of IDDM, especially in developing countries, have given divergent results. To define the factors responsible for these divergent results, more epidemiological studies in different geographic areas and ethnicities are still needed. Because of this necessity, this study was conducted to evaluate the prevalence of IDDM in Nigerian Igbo (black) children born and living in continental Africa.

RESEARCH DESIGN AND METHODS

— This survey was limited to schoolchildren aged 5–17 yr born and living in the Ezza, Ishielu, and Ohaukwu communities of the Anambra State of Nigeria. These three communities belong to the Igbos, the predominant tribe in southeastern Nigeria. According to the list of pupils in the primary schools in these communities, which is available at the offices of the councils' inspectors of education, compared with the registers of the schools' headmasters, 78,643 children aged 5–17 yr were enrolled in the elementary schools, but only 77,862 (99%) children answered our questionnaires, on which further participation was based.

Our study took place from June–August 1990. Arrangements for this study included explanations of the design and purpose to the Ezza, Ishielu, and Ohaukwu parents' and teachers' councils and the area inspectors of education. All were necessary to obtain parental and government consent and ethical acceptance. The study started with distribution of questionnaires on age; sex; history of diseases, including diabetes; recent visit to doctors; drugs being taken; information on some diabetic symptoms like enuresis, polyuria, polydipsia, polyphagia, and weight loss; and whether or not siblings have such symptoms. Each school was visited first by a member of the investigative team. Information was provided about the questionnaires and the way to answer them, and questions that the teachers had were answered. A day after the visit to the school, the questionnaires were an-

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IDDM, INSULIN-DEPENDENT DIABETES MELLITUS; CPR, CRUDE PREVALENCE RATE; WHO, WORLD HEALTH ORGANIZATION.

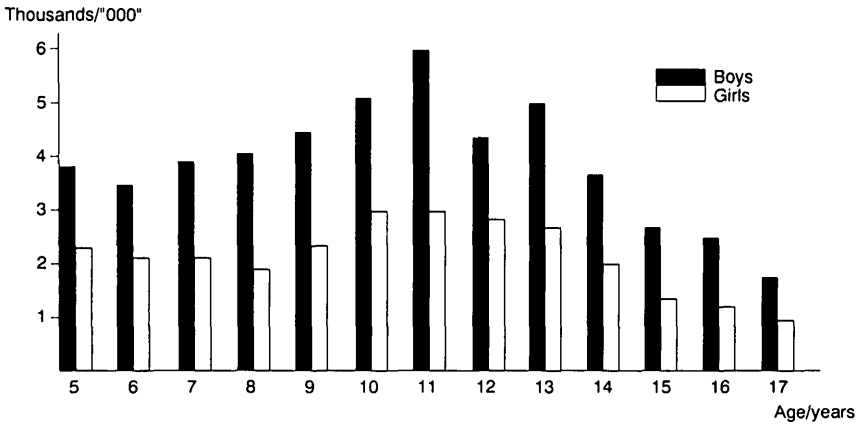

Figure 1—*Age and sex distribution of subjects in surveyed population.*

swered by the pupils with assistance from their teachers. At least one of the researchers was present during this exercise. From the survey, subjects who had signs and symptoms suggestive of diabetes were investigated further.

In a class in which a student had a positive response to our questions suggestive of diabetes, all class members were tested for glucosuria (Table 1). Our reason for this was to determine whether we could find subjects with glucosuria but without any symptoms. Therefore, all subjects with positive answers and their classmates were requested to fast overnight and report to an assigned testing room the following morning between 0800 and 0830. Each subject had his/her urine examined for glucose with Clinistix urine strips. Those with aglucosuric urine samples were not investigated further, except for 4 children (same age but of both sexes) who were selected randomly from each class in which a child with glucosuria was present to have the same blood glucose measurements made as the glucosuric child. This method provided an excellent reference group. Any child who confessed to taking any drugs that could affect glucose metabolism in the preceeding 12 h was excluded from the tests.

The blood glucose of all those with glucosuria was determined with a wipe-off strip plus a refractometer (Blood Glucometer, Refloux, Boehringer, Mannheim, Germany). The criteria for the definition of questioned diabetes was based on fasting blood glucose values >7 mM in three serial determinations as recommended by WHO (4). Because children with fasting blood glucose values >7 mM needed further examinations to confirm diabetes. These children were referred to the most convenient hospitals, where they were further investigated. Some who consistently presented data suggestive of IDDM were given pertinent education and insulin by the referred hospital clinicians.

Table 1—*Characteristics of children surveyed*

	Community and age-groups	N	N and % that answered questions	Positive answers	Glucosuric tests	Positive glucosuria	Hyperglycemia tests	Positive hyperglycemia	Confirmed new cases of IDDM	Previously diag. cases of IDDM	Total IDDM cases	CPR/1000	P
Ezza													
A	5–9.99 yr	12,464	12,364 (99.2%)	11	275	1	5	0	0	0	0	0.00	
B	10–13.99 yr	14,748	14,699 (99.7%)	37	925	20	100	7	3	2	5	0.34	vs. A < 0.001
C	14–17 yr	6834	6814 (99.7%)	17	425	12	60	4	2	4	6	0.88	vs. B < 0.001
D	5–17 yr	34,046	33,877 (99.5%)	65	1625	33	165	11	5	6	11	0.33	vs. H < 0.09
Ishielu													
E	5–9.99 yr	7588	7435 (98%)	8	240	3	15	1	1	0	1	0.14	vs. F,G < 0.001
F	10–13.99 yr	8247	8167 (99%)	16	480	11	55	4	1	4	5	0.61	
G	14–17 yr	3933	3873 (98.5%)	22	660	10	50	2	2	1	3	0.78	
H	5–17 yr	19,768	19,475 (98.5%)	46	1380	24	120	7	4	5	9	0.46	vs. L < 0.01
Ohaukwu													
I	5–9.99 yr	11,253	11,053 (98.2%)	9	270	2	10	0	0	0	0	0.00	vs. J,K < 0.001
J	10–13.99 yr	9261	9172 (99%)	18	540	5	25	2	2	2	4	0.44	
K	14–17 yr	4315	4285 (99.3%)	11	330	4	20	3	1	1	2	0.47	
L	5–17 yr	24,829	24,510 (98.5%)	38	1140	11	55	5	3	3	6	0.25	
M	Total	78,643	77,862 (99%)	149	4145	68	340	23	12	14	26	0.33	

The χ^2 technique was used to test the level of significance between variables, with $P < 0.05$ and $P < 0.001$ as the lowest and highest levels of significance, respectively.

RESULTS — Although the number of previously diagnosed cases of IDDM in the three communities was 14, 12 new cases were discovered during this investigation, making the total number 26. This gave a CPR of 0.33/1000. In Ezza, the CPR was 0.33/1000; in Ishielu, it was 0.46/1000; and in Ohaukwu it was 0.25/1000. The CPR for Ishielu was statistically different ($P < 0.01$) from that of Ohaukwu. The CPR for boys was 0.38/1000 compared with 0.25/1000 ($P < 0.006$) for girls. Of 30,852 children in the 5–9.99 yr age-group, only one boy had IDDM, giving a CPR of 0.03/1000 (Table 1). In the 10–13.99 yr age-group, the CPR was 0.44/1000 compared with 0.74/1000 ($P < 0.01$) in the 14–17 yr age-group. The dominating symptoms were polyuria, polyphagia, weight loss, polydipsia, and gastroenteritis. In the 14 previously diagnosed patients, who had been diabetic for 0.5–6 (median 1.6) yr, ketoacidosis had occurred seven times.

CONCLUSION — In this survey, not all children with glucosuria and/or hyperglycemia had diabetes. It is possible that the hyperglycemic children without diabetes are potential patients who, with time, could develop diabetes. Similar findings of high blood glucose without diabetes in apparently healthy children were reported by other researchers (5). The overall CPR of IDDM among these children is lower than what has been reported for some other developing countries, including African countries (2,3), but higher than those reported for some Middle Eastern and Asian countries (6,7). Differences in prevalence have been observed, even though between these communities the same methods were used. This indicates that genetic, geographical, and ethnic subcultural factors are important. Such differences in prevalence in other closely related African groups have been reported previously (8). Boys had a higher prevalence rate than girls, contrary to findings in similar populations (9). This result may be explained by fewer girls in schools or poor survival of diabetic girls in an Igbo subculture which views girls as inferior individuals.

The prevalence of IDDM was rare in children <10 yr, which is an opposite finding from reports of several cases <10 yr of age in similar malnourished populations (10). This may indicate a lower survival rate of IDDM patients in this age-group in the Igbos or differences in ascertainment and methodologies between these studies. It is difficult to estimate the prevalence of IDDM in the whole Nigerian population by using samples from one tribal community, because the country is made up of several tribes, each with its own lifestyle, economic level, staple foodstuff, major occupation, and, perhaps, genotypes. This study, however, provides some knowledge about the epidemiological aspects of IDDM in the Nigerian population. Although the prevalence is relatively high, the incidence might be much higher, because prevalence studies include case survival, which might be extremely low in these communities with poor medical attention.

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