DIABETES MELLITUS IN THE RHODESIAN AFRICAN

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Diabetes mellitus is commonly encountered in African hospital practice in Central Africa, and at any time a number of cases of this disorder are to be found in the medical wards. Over the past 20 years a similar frequency has been observed, and it is not our impression that the incidence of the disease is increasing.

Despite the number of cases seen in hospital practice there is fairly good evidence to show that diabetes mellitus is still an uncommon disorder among Africans living in the two Rhodesias and Nyasaland. In a population survey carried out by Carr and Gelfand[1] in Highfield African Township, Salisbury, in 1960, urine testing of over 1,000 persons revealed an incidence of 0·1%. This figure is one of the lowest in the world. It must be admitted, however, that there is a predominance of the younger age groups in Highfield Township and, had an older population been sampled, the incidence would probably have been higher. Nevertheless, other local evidence as regards Africans also tends to support the findings in this survey. For example, Ryan's survey of school children at Highfield during 1959[2] showed the disease to be extremely rare, and in the maternity hospitals in both Salisbury and Bulawayo the incidence of diabetes in the mothers is very low.[3] During the 2-year period ended 1 April 1963 Bland[3] found only one diabetic mother in 15,521 deliveries at the maternity unit of Harari Hospital. This gives an incidence of 0·0064%, compared with 0·05% found at Queen Charlotte's Hospital, London, during the period 1944 - 53.

Davidson[4] has recently carried out a glycosuria survey in the outpatient department of Lilongwe African Hospital, Nyasaland. 4,725 urines were tested with 'tes-tape' and 6 were found to be positive. Blood-sugar estimations of 4 of these, however, showed that only one patient had diabetes. These results indicate a very low incidence of diabetes in the African in the Central Province of Nyasaland, where the diet consists mainly of maize with supplements of vegetables and very occasionally meat and fat. Davidson's survey included individuals under the age of 20 years (in contrast with that of Carr and Gelfand[1]), but in both surveys the percentage of Africans over the age of 50 years was small. In Europe two-thirds of diabetics are over this age, and so the shorter life span of the African may be a factor in lowering the incidence rate of diabetes.

A hospital survey that Politzer and Schneider[5] carried out in Basutoland showed results rather similar to those found in Salisbury and Lilongwe. An outpatient analysis revealed an incidence of 0·23% among 3,000 Basuto. The community in Basutoland may well be less sophisticated than the urban population investigated in Salisbury, but the basic dietary patterns are similar. By contrast, Campbell[6] states that the disease in the Zulu in Natal is on the increase and according to him 90% of sufferers are settled urban dwellers, while Seftel and Abrams[7] give an incidence of 1·27% in the Johannesburg area. Among the Negroes in Trinidad the incidence is 1·4%,[8] and in a pilot survey in Jamaica it was found to be 0·73%.[9] The incidence of the disease in the USA has been given as 1·7%.[10]

Tables I and II (compiled by Tulloch[11]) summarize some of the hospital and population surveys that have been carried out. Davidson's findings in Lilongwe Hospital have been added to Table I.

TABLE I. HOSPITAL DIABETES SURVEYS

Country	*Hospital*	*Age distribution*	*% Incidence of diabetes*
Basutoland	Seboehe	20·85	0·23
Transvaal	Baragwanath	30+	1·27
Cape Province	Langa	All ages	0·22
Ghana	Ko	All ages	0·4
Nyasaland	Lilongwe	All ages	0·1

TABLE II. POPULATION SURVEYS

Country	*Age distribution*	*% Incidence of diabetes*
Jamaica	15+	1·26
Southern Rhodesia	14+	0·1
Natal (Indians)	20+	5·5

AETIOLOGICAL FACTORS

Diet

Even should diabetes mellitus be uncommon in the general African population it would be interesting to know whether those who develop the disease have a diet different from that enjoyed by the traditional African. In an analysis of their cases Carr and Gelfand[1] have expressed the opinion that the traditional high-carbohydrate, low-fat and low-protein diet is the main factor that keeps the disease at a low level and that the increasing consumption of cane sugar together with the corresponding increase in dietary fat might account for any possible rise in the incidence of diabetes in the African population. In the African reserves in Southern Rhodesia there has been a significant increase in the number of general dealers' licences issued. In 1949 there were about 500 stores, whereas in 1959 the figure had risen to 6,000. At these stores Africans purchase refined sugar, cooking oil and fat, canned foods, bread, biscuits, 'mineral waters' and salt. Thus there may be large numbers of Africans whose diet has changed greatly over a short period of time, and it seems possible that increased intake of fat and refined sugar may be precipitating factors in those who already have a predisposition to the disease. Support for this view comes from Campbell's findings[12] that the Zulu urban dweller is more prone to develop diabetes than the rural Zulu,

and that animal fats and oils provide 15% of the calories of urban dwellers, but only 2% of the calories of the rural population.

Heredity

In the European a hereditary diabetic influence can often by shown, but in our African practice this factor would appear to be unimportant, although it must be admitted that the family history is often unreliable. Of 50 diabetics who were specifically questioned, only one gave a family history of the disease, but this man said he had two diabetic brothers, one controlled on insulin and the other on no treatment. This compares with Campbell's finding,[12] quoted by Tulloch,[11] of a hereditary factor in 2% of 133 Zulu diabetics.

Social Background

It would seem that the African who has adopted certain features of European civilization is more likely to develop the disease than the African who continues to pursue his traditional way of life. For purposes of analysis Carr and Gelfand[1] divided African patients into 3 groups. Group I includes the great majority of Africans, who retain their rural customs and traditions and consume the typically African diet. Group-II Africans continue to eat the traditional African diet, but with certain modifications, and have adopted many European ways of living. They can speak good English, work in fairly close contact with Europeans, and live mostly in the towns. Group III comprises those few Africans who have completely adopted the European way of life. These authors found that most of their African cases of diabetes fell into Group II and that the proportion in this group was greater than could be expected from the general distribution of population. Of 25 cases they investigated from this aspect, 13 lived in urban areas and of the 12 who hailed from rural areas only 5 dwelt in African villages and followed the traditional way of life. More recently, however, we have been less impressed with this tendency. Of 50 recent cases, 31 were considered to fall into Group I, 18 into Group II, and one, a clergyman, into Group III. An observation that should perhaps be noted is that an interpreter is less frequently required in the diabetic clinic than in the general medical clinic in the outpatient department of Harari Hospital.

Age

Most of our cases, whether male or female, are seen between the ages of 20 and 60, the greatest number occurring between 30 and 50. Gelfand and Carr[13] estimated the ages of 70 male and 29 female patients as shown in Table III. It will be observed that no case was seen under 10 years of age. Diabetes mellitus appears to be very rare in young children. Whether this is a true racial characteristic is difficult to say. It seems unlikely that many diabetic children in hospital would go undiagnosed. No case has since been encountered in the paediatric ward.[14] Tulloch[11] also comments on the rarity of diabetes in childhood and adolescence, especially since at least a third of the population in his survey are under 15. It would tend to support our conclusion that diabetes is rarely linked with a hereditary factor in African society.

TABLE III. AGE INCIDENCE, AFRICAN DIABETICS, HARARI HOSPITAL 1961[13]

		Male		Female		
	Age group	*No.*	*%*	*No.*	*%*	
	0 – 9	0	0·0	0	0·0	
	10 – 19	3	4·3	1	3·4	
50%	20 – 29	19	27·2	6	20·7	41·4%
	30 – 39	16	22·8	6	20·7	
	40 – 49	15	21·4	8	27·7	
	50 – 59	9	12·9	5	17·2	
	60 and over	8	11·4	3	10·3	
		70	100·0	29	100·0	

In our present series of 92 males and 58 females (Table IV) the youngest patients were 2 females aged about 7 and 8 years. In the older age groups (50 - 70 years) a higher proportion of females than males was found, but among younger patients there were more males than females. This is in keeping with Tulloch's finding that the sex distribution among young diabetics is equal or shows a slight preponderance of males, whereas among middle-aged and elderly diabetics women predominate.[11] In Uganda, on the other hand, Shaper[15] found the reverse.

TABLE IV. AGE INCIDENCE, AFRICAN DIABETICS, HARARI HOSPITAL, PRESENT SERIES

Age group	*Males*		*Females*	
	No.	*%*	*No.*	*%*
0 – 9	—	—	2	3
10 – 19	2	2	5	9
20 – 19	19	21	9	16
30 – 39	24	26	11	19
40 – 49	26	28	12	21
50 – 59	16	18	13	22
60 – 69	2	2	6	10
70+	3	3	—	—
	92	100	58	100

These figures also reveal that a large proportion of African diabetics are relatively young in contrast to European diabetics, among whom greater numbers are found in the older age groups (insulin-independent, type II diabetes). The increased frequency of type I diabetes (insulin-dependent) probably accounts for our observation that the African diabetic on the whole requires greater amounts of insulin, has a greater liability to ketosis, and is disappointing in his response to oral hypoglycaemic agents.

The younger age incidence of diabetes in the African may also relate to the observation that there are relatively few obese African diabetics, whereas leanness is very common and often amounts to emaciation. Out of the 92 males, only 2 were markedly obese and 3 others were well covered, while 34 were more than 10% below their expected weight for height and age. Out of 58 females, 3 were overweight and 18 were more than 10% underweight. All the overweight patients were in the older age groups, and all 5 markedly obese were hypertensive. Obesity has been placed high as a factor in the development of diabetes.[10] In the tropics of Africa it would appear to be an important aetiological factor, especially among females.[15,16] Our experience tends to agree with this view, in that obesity is more a feature of females in the older age groups in contrast to the marked tendency towards leanness in both sexes in younger diabetics.

Other Factors

At least two other aetiological factors should be mentioned besides obesity. Shaper[15] made the important observation that *calcification of the pancreas* is not uncommon in African diabetics in Uganda. This has been confirmed in Nigeria, and it is also a feature of the diabetic picture in the Dutch East Indies, where it has been suggested that fibrosis and later calcification of the pancreas follow upon damage from kwashiorkor sustained early in life. However, it appears that in Southern Africa, and certainly in Rhodesia, where kwashiorkor is prevalent, a calcified pancreas is a great rarity. In a S. Rhodesian series of 99 cases[12] (1961) pancreatic calcification was noted on only one occasion, and in the subsequent 2 years we have not met with a case. The discrepancy in the incidence of pancreatic calcification between the two regions of Africa poses an interesting problem.

Equally surprising is the fact that siderosis and Bantu porphyria are both very common in South Africa and Rhodesia, whereas they are rare in African territories in the Northern regions of tropical Africa, except Ghana.[16, 17] It has recently been reported that 5 – 10% of South African Bantu with diabetes have fully developed *siderosis* with deposition of large amounts of iron in the pancreas,[18] and also that Bantu suffering from *porphyria,* which is then usually accompanied by siderosis, may also develop diabetes.[17] Since, however, probably no less than 75% of adult Africans have siderosis to a greater or lesser extent, one would expect to meet many cases of diabetes with this association.

Hepatic cirrhosis with siderosis frequently occurs in clinical practice in Rhodesia. In a series of 27 liver biopsies performed on subjects with hepatic cirrhosis, siderosis was present in 15 (55%). Yet, in our experience, diabetes is rarely seen in association with cirrhosis of the liver. In a series of 48 patients with clinical cirrhosis of the liver, only one case of diabetes was found; and, of 14 patients with cirrhosis of the liver and siderosis shown by liver biopsy, only one had diabetes. Conversely, in the present series of 158 diabetic patients, only 6 of the 92 males were considered to have probable hepatic cirrhosis (no biopsies were performed) while 4 more had slight smooth enlargement of the liver; and none of the 58 females was thought to have cirrhosis. Tulloch[11] also failed to find any association between cirrhosis of the liver and diabetes in his West Indian series of cases.

It is not easy to give the incidence of diabetes in patients with Bantu porphyria, but in our experience it appears to be less frequent than in the Transvaal. For instance, in a series of 23 consecutive African male patients with porphyria, no case of diabetes or of raised blood-sugar level was discovered. In our experience, therefore, there would appear no great tendency for subjects with either siderosis or porphyria to develop diabetes, though we have on occasion encountered diabetes and porphyria in the same patient.

We have not so far encountered a case of xanthomatosis or hypercholesterolaemia, but Thomas[19] has described a case of diabetic xanthomatosis in a 14-year-old African male admitted to hospital in Bulawayo.

CLINICAL FEATURES

Diabetes mellitus in the African is usually easy to recognize because of the relatively lower age incidence than in European practice. Thirst and polyuria are prominent symptoms, but polyphagia is not often mentioned, probably because food resources are often limited in any case. Out of 92 male diabetics, 39 gave a typical history of thirst and polyuria on their own account, while 6 of the 58 females volunteered these symptoms. A history of loss of weight, often considerable, can almost invariably be obtained by specific enquiry, but in our experience the patient rarely mentions this as a presenting symptom. The disease may be missed clinically because many patients do not regard symptoms such as weakness, loss of weight, thirst and increased appetite as worth mentioning. They are not regarded as abnormal, whereas pain will certainly be mentioned.

One of the most frequent symptoms volunteered is abdominal pain; in 16% of our cases it was the presenting symptom. Together with constipation it is not infrequently an early manifestation of diabetic acidosis. Occasionally pain elsewhere than in the abdomen is the main complaint and 2 patients presented with pain in the legs due to diabetic neuritis. Generalized weakness is another not infrequent complaint.

Perhaps because we see a preponderance of type I diabetes in the African, an important and not uncommon mode of presentation is diabetic acidosis. The patient may be admitted in precoma or coma, which as a rule responds well to treatment, provided this is instituted early enough. Of our 92 males, 12 were admitted with diabetic acidosis, 4 in coma and 8 in the precoma stage; and 8 of the 12 males were under 35. Of the 58 females, 4 were admitted in coma and 4 in precoma; all but one of the 8 were under 30. The reported incidence of acidosis in African diabetics from a number of countries varies from 12% to 22·2%, but among Jamaicans it is said to be only 2·9%.[11] The reason for this striking difference is not obvious. Table V, expanded from Tulloch's analysis, shows the incidence of diabetic acidosis among diabetics admitted to hospital.

TABLE V. INCIDENCE OF ACIDOSIS IN DIABETICS

Country	*Author*	*No. of cases*	*%*
Ghana	Dodu[35]	6 out of 50	12
S. Rhodesia	Gelfand and Carr[12]	17 out of 99	17·2
S. Rhodesia	Gelfand and Forbes	20 out of 150	13·3
Uganda	Shaper[15]	44 out of 198	22·2
South Africa	Seftel and Schultz[20]	53 out of 250	21·2
Jamaica	Tulloch	3 out of 103	2·9

The severity of diabetes in the African patient is reflected in the glucose-tolerance curve, which is frequently grossly diabetic in height and shape. Table VI shows 125 of our patients classified as mild, moderate, severe and very severe, according to the highest blood-sugar level. Thus 61% of males and 43% of females were considered to be severe or very severe, whereas only 4% of males and 10% of females were considered to be mild.

TABLE VI. GLUCOSE-TOLERANCE CURVES

Severity	*Highest blood-sugar level*	*Male*	*Female*	*Total*
Mild	Less than 200 mg.%	3	5	8
Moderate	200 – 300 mg.%	26	24	50
Severe	300 – 400 mg.%	26	10	36
Very severe	More than 400 mg.%	19	12	31
		74	51	125

About a quarter of the patients in our series presented with one of the complications of the disease, such as sepsis, poor vision, pruritus vulvae or, rarely, peripheral neuritis. About half this number of cases (12%) were discovered incidentally during the course of investigation of unrelated conditions, including traumatic fractures, headaches, arthritis and enteritis.

Impotence was not a complaint voluntarily mentioned by our patients, but out of 23 newly diagnosed male diabetic patients specifically questioned on this point, 6 said

that they had been impotent for periods varying between 3 weeks and 6 months, and in one case for 8 years.

Thirty patients (13 male and 17 female) who were or had been married were questioned at the time of diagnosis about the size of their families. Only 2 (both males) had no children. The others had from 1 to 10 children, the average number being 5. It appears, therefore, that among our patients the prediabetic state did not reduce fertility.

Complications

The association between diabetes and *atherosclerosis* is well known in the European, but in our experience atherosclerosis is uncommon in the African diabetic patient. In our series we did not meet a case of obliterative vascular disease of the lower limbs leading to intermittent claudication or gangrene. Coronary artery disease, according to Tulloch,[11] is the common single cause of death in temperate zones, and he has drawn attention to its great rarity in the African. He also mentions that gangrene of the extremities is common in the diabetic—a contrast to our findings in the African.

Hypertension is a common finding in African practice, and among our diabetic patients are many with raised blood pressure. Out of 50 diabetics, 15 were hypertensive (7 of the 29 males and 8 of the 21 females), having diastolic blood pressures higher than 100 mm. Hg at the time when their diabetes was diagnosed. Most of the hypertensive diabetics were in the older age groups, but 4 of these 15 were under 40, viz. 2 males aged 26 and 28 and 2 females aged 18 and 32. The most severe hypertension was in 2 females, aged 55 (BP 230/115) and 50 (BP 185/130). No case of malignant hypertension was encountered. It would seem that up to the age of 69 the incidence of hypertension in Britain is no greater among diabetics than non-diabetics, but after that age it becomes far commoner in diabetics than non-diabetics. Tulloch[11] noticed in his Jamaican series a much greater incidence of hypertension in the female diabetic than in the male; in both sexes the blood pressure appeared to be higher when the diabetes was never properly controlled. In our series hypertension was a frequent finding in both sexes and the incidence was slightly higher in female diabetics.

Diabetic neuritis, like atherosclerosis, seems to be uncommon in our African diabetics, and probably for the same reason, because atherosclerosis in the tiny arterioles supplying the nerves is believed to be responsible for the neuritis. Minor neurological signs such as loss or diminution of knee or ankle jerks and impaired vibration sense are not uncommon but these are difficult to assess because they are frequently found in the poorer classes of African without diabetes. Certainly the severer forms of diabetic neuritis are rare, though one of our patients, a male of about 40, presented with pain in the legs and gross ataxia and was found to have all the signs of severe peripheral neuritis of the lower limbs. Cranial nerve palsies also appear to be rare in the African diabetic. In Jamaica, according to Tulloch,[11] diabetic neuritis is associated with poor control of the diabetic state, but this is not our impression in Rhodesia. On the other hand, Tulloch reports that unusual neurological manifestations are not common in diabetic cases among the indigenous people of the West Indies, which seems to accord with our findings in Africans.

Retinal changes are seen in our African diabetics although they are not common. Thus out of 73 whose fundi were carefully examined, most of them by an ophthalmologist (Dr. P. A. S. Evans), diabetic retinopathy was detected in only 3. The patients were aged 55, 50 and 42; 2 of them were moderately hypertensive as well as diabetic. Their retinae showed a mixture of diabetic and hypertensive changes, with microaneurysms and also arterial narrowing, arteriovenous nipping, flame-shaped haemorrhages, and soft fluffy exudates.

Cataract is much commoner than retinopathy among our African diabetic patients; 16 (7 males and 9 females) out of our 150 patients were found to have cataract. Nearly always the cataracts are of the senile type, and occasionally the disease has been discovered when a routine urine examination has been carried out on patients admitted to the ophthalmological wards with poor vision due to cataract. Occasionally, too, poor vision has been the main complaint in the absence of obvious lens or retinal abnormalities. This has presumably been associated with osmotic changes in the lens, because vision has rapidly improved with control of the patient's diabetes.

No case of *diabetic glomerulosclerosis* was encountered in the present series, though we have seen the occasional case. Its infrequency may be partly because most of our African diabetics are in the younger age groups, or it may be that this syndrome is in some way linked with a degenerative process in the arteries related to atherosclerosis.

Sepsis probably complicates diabetes in the African as often as in the European; and about 5% of our patients presented with sepsis in one form or another. In most cases it affected the extremities, but one patient had acute osteomyelitis, another a jaw abscess, and a third a lung abscess. During the course of the disease we have occasionally seen septic and ulcerative skin lesions resulting from the use of inadequately sterilized needles. Pyogenic infections, including boils, abscesses and urinary infections, are commoner in Jamaica, where sepsis occurs in about 26% of diabetic cases.[11] It is our experience that boils and carbuncles are rare in African diabetic patients. *Tuberculosis* also seems to complicate diabetes less frequently than one might expect, knowing the liability of the African to contract a tuberculous infection. Two males out of 92 in our series had pulmonary tuberculosis and a third a pleural effusion. One female out of 58 had tuberculosis and another had been treated and cured of the disease about 2 years before the clinical onset of her diabetes. The incidence of pulmonary tuberculosis in diabetics in Jamaica (0·9%) is reported[11] as lower than that in America (8·4%). On the other hand, Campbell[6] found it to be 4·5% in his Zulu diabetics.

The preponderance of type I diabetes in our Africans and the frequency of *diabetic coma* have already been mentioned. We are of the opinion that hypoglycaemic coma, too, is more commonly met with than in European practice. This is partly because of the large doses of insulin that are freqently required to control the blood sugar and partly because of failure on the part of the insulin patient to appreciate the danger of missing a meal or of taking an undue amount of exercise, or because of laxity about the exact measurement of the insulin dosage. In the present series 9 out of the 92 males and 5 out of the 58 females have had one or more episodes of hypoglycaemic coma.

Table VII shows the percentage incidence of complications in reported series of diabetes among Africans in Uganda, S. Rhodesia and Zululand, as well as in the present series.

TABLE VII. A COMPARISON BETWEEN DIABETIC COMPLICATIONS FOUND IN 4 AFRICAN SERIES OF CASES (*modified from Tulloch*[11])

All figures expressed as percentages

Diabetic Complications	*Uganda*	*S. Rhodesia*	*Zululand*	*S. Rhodesia (present series)*
Retinal changes	4	—	9	4·1
Cataract	11·0	7	—	10·7
Hypertension	13·0	31	30·4	30·0
Peripheral vascular disease	—	—	2·5	0
Gangrene	1·5	1	—	0
Peripheral neuritis	19·5	—	1·5	4
Infections—skin	13·5	1	—	12·0
—urine	11·5	3	—	7·3
Tuberculosis	2·5	1	4·5	2·7
Ketosis (severe)	22	17	10·0	13·3

TREATMENT

Satisfactory dietary control is practically impossible to achieve in the African diabetic patient. The traditional African diet consists predominantly of carbohydrate, while fat and protein intake are low and depend largely on the patient's financial status. There is little point, therefore, in controlling a diabetic patient on a reduced carbohydrate and increased protein diet while he is in hospital, when it is perfectly clear that on discharge he will not be

able to maintain it. Furthermore, apart from its low cost, *sadsa*, made from maize meal, is greatly enjoyed by the African, who uses the word synonymously for food, and he is very reluctant to eat less of it. Similarly, attempts at weight reduction in those few of our diabetic patients who are obese have usually been unsuccessful, because of lack of cooperation on the part of the patient. The only way, therefore, in which we attempt to influence the diet of our patients is by trying to impress upon them the importance of having regular and approximately equal meals and, in particular, the danger of missing a meal when on insulin therapy. Within these limitations the diet is free, and we attempt to control the hyperglycaemia with insulin or, where possible, oral hypoglycaemic agents. One disadvantage in this approach that we have observed on a number of occasions is that as insulin dosage is increased, so the patient increases his carbohydrate intake, so that hyperglycaemia and glycosuria persist at much the same level. Notwithstanding this tendency it seems to us that insulin requirements generally tend to be higher than those seen in European practice.

Assessment of insulin dosage is frequently difficult because of the fear of inducing hypoglycaemic attacks, and we probably tend to under-control the hyperglycaemia for this reason. Nevertheless, high doses of insulin are frequently required and this finding would appear to lend support to the view mentioned above that the majority of our patients are the young insulin-dependent type. The drug treatment on which 80 patients were discharged from hospital after control of their diabetes is shown in Table VIII. The majority (54%) of patients required between 50

TABLE VIII. DRUG TREATMENT ON DISCHARGE FROM HOSPITAL

	Male	*Female*
Insulin 0–50 units/day	13	7
51–100 units/day	23	20
101–150 units/day	6	1
151–200 units/day	—	2
Tolbutamide	3	3
Chlorpropamide	1	—
No hypoglycaemic agent necessary	1	—
Total	47	33

and 100 units of insulin a day, while the smallest daily amount required by any patient was 20 units and the greatest amount 160 units. Only 7 of these 80 patients could be controlled on oral hypoglycaemic drugs and we have observed that these agents are, by and large, less successful in controlling African diabetics than Europeans. However, it should be noted that a further 7 of the patients who were discharged from hospital on insulin therapy (with daily dosages ranging from 20 to 80 units), were subsequently changed to and satisfactorily controlled on tolbutamide.

Great variation in insulin requirement has been observed in individual patients from time to time. For example, a male aged 40 years was admitted complaining of gross ataxia and was found to have severe peripheral neuritis affecting his lower limbs. His fasting blood sugar was 420 mg./100 ml. and a glucose tolerance curve showed a peak level of 710 mg./100 ml. after 1 hour and a level of 550 mg./100ml. after 2 hours. His diabetes was controlled on 30 units of insulin zinc suspension (lente) a day and his peripheral neuritis showed steady improvement. After 15 months he was changed to tolbutamide and has remained well controlled and with no neuritis for 2½ years since then. Another male aged 16 years was admitted complaining of weakness and loss of weight and was found to have glycosuria and slight ketonuria. He had no sepsis. Fasting blood sugar was 374 mg./100 ml., and a glucose tolerance curve showed a blood sugar after 2 hours of 690 mg./100 ml. The patient's diabetes was controlled and he was discharged on 80 units of IZS (lente) a day, but this was progressively reduced at the diabetic clinic after hypoglycaemic episodes, until 8 months later, when he was changed to tolbutamide. After a further 8 months treatment was stopped altogether, and 2 months thereafter when the glucose tolerance curve was repeated the blood sugar was 94 mg./100 ml. fasting, rose to 210 mg./100 ml. after 1 hour, and was 142 mg./100 ml. after 2 hours. No precipitating agent could be detected at the time of this patient's original presentation, and careful enquiry failed to elicit a history of the excessive sugar consumption that has been suggested as a cause of such cases by Del Greco and Scapellato.[21] It would appear, therefore, that spontaneous remission of diabetes occasionally occurs in the African as in other races.

Follow-up of the African patient after discharge from hospital is always difficult. This is partly because of the long distances they may have to travel and the lack of transport facilities, but also because many fail to appreciate the need for long-term therapy, even when this is explained to them. Once their symptoms have been relieved they cannot see any reason for further treatment. Diabetic patients seem to be better than most others from a follow-up point of view, probably because they soon feel the ill-effects of failing to continue with their prescribed therapy. On discharge about a fifth of our patients are referred to other hospitals for follow-up care. The remainder are asked to return to the diabetic clinic; of these about 50% attend more or less regularly, 12% come once or twice and then abscond, and the remaining 38% fail to attend at all.

COMMENT

While we would be hesitant to claim that we meet with a special form of diabetes mellitus in the African of Rhodesia, the disease undoubtedly tends to follow a different pattern to that encountered in European practice. On the whole the features of presentation in the African are typical of what we associate with diabetes—namely thirst and polyuria, tiredness and pruritus—but the patient requires larger amounts of insulin for control than we normally expect in the European, in keeping with the marked degree of hyperglycaemia many display. Yet despite this seemingly innocent hyperglycaemia he is liable to develop ketosis or even hypoglycaemia should the body requirements of insulin be overstepped, and rarely displays any of the serious arterial, neural or renal complications. This type of diabetes is seen more often in the relatively young adult, but at the same time even the more elderly follows the pattern just described. The distinction between type I and type II diabetes is not so clearly defined. We have not encountered the resistant types described in the West

Indies[22] and the 'K' type in Uganda[15] (Shaper, 1958). However, we have presented our facts, which indicate that the usual form the disease assumes in the African in Rhodesia follows a well-defined pattern, seemingly different from what we have met with in the European—a form for which we suggest the term *'insulin-dependent sequela-free diabetes'*.

We agree that the African with porphyria too may develop diabetes, but this association would appear to be less common than has been reported from the Transvaal.[17] But whatever the cause or predisposing factors for diabetes mellitus, the form generally assumed by it in our African would be included in the term insulin-dependent sequela-free diabetes.

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