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Diabetes Mellitus in the African in Rhodesia

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In recent years an increasing interest has been shown in the way diabetes mellitus manifests itself in the tropics. This largely follows the publications of P. Hugh-Jones (1955) from Jamaica, in which he refers to a new type of diabetes seen in the Negroes of the West Indies and which he has labelled J-diabetes. More recently, J. B. Cosnett (1959) has described J-diabetes in the Natal Indian, and A. G. Shaper (1959) in Uganda has reported the occurrence of pancreatic fibrosis and calcification in the African, and suggests that this may be the end result of protein malnutrition. Besides the diabetic symptoms, there may also be steatorrhoea, hypoalbuminaemia and skin and hair changes. In an earlier publication, Shaper (1958) records the pattern of diabetes in Africans from Uganda. Besides Type I and Type II, he describes a third type "Variant K" found in those age groups in which Type I predominates. He differentiates his "Variant K" from Type I, in that the insulin requirements are not very high, hypoglycaemia was sometimes seen and that ketosis was rare. The diabetic can also go for a long period without developing ketosis.

Edington (1957), working in Ghana, where he has found haemosiderosis to be not uncommon, considers that diabetes mellitus may form part of the syndrome, following the deposition of iron in the pancreas, and some corroboration from South Africa, where Bantu siderosis is commonly seen, has recently appeared (C. Isaacson *et al.*, 1960).

There seems to be a growing impression that diabetes mellitus is on the increase in the African, although proof of this is not established. It may well be that doctors are becoming more "diabetes conscious" and as a consequence are finding it more regularly.

The object of this communication is to present some of the findings on diabetes as it occurred

in the African admitted to the African hospital in Salisbury. Diabetes is a complicated disease covering many different facets and we do not claim that we have covered adequately its many features. It is our intention rather to refer to our experience of some of the commoner manifestations of the disease.

There are many difficulties involved in the study of diabetes in the African. A disease of this nature lasting over many years requires a strict regime which many patients are incapable of undertaking, particularly with regard to diet and injections. Many of these unfortunate sufferers cannot understand the purpose of the treatment and it is rare to find an individual who is capable of continuing a course of injections for a long period. Stabilisation is very often a problem, as many patients refuse to stay in hospital long enough for this to be established adequately.

A survey recently carried out on Salisbury Africans (Carr and Gelfand, 1961) indicates that diabetes is less prevalent here than in most other parts of the world, particularly in comparison with areas where more processed and highly refined foods are purchased. The traditionally high carbohydrate, low fat and low animal protein diet is, we believe, the main factor involved in keeping the disease at a low level. There are, of course, increasingly large numbers of Africans whose diet is changing tremendously over short periods of time towards higher fat, refined sugar and animal protein consumption, but as yet they are insufficient in numbers to indicate whether this will have an effect on the incidence of diabetes and, *inter alia*, coronary thrombosis.

It must be appreciated that there are a number of subtle changes occurring in the diet of Africans in even the most remote areas, and these changes are increasing rapidly. This is underlined by the number of general dealers' licences issued in Native reserves: in 1949 the figure was about 500 and in 1959 it had increased to 6,000. All these stores sell foods such as refined sugar, cooking oil and fat, canned foods, bread, buns, biscuits, mineral waters and salt. This may well produce changes in the incidence of the disease in time.

METHODS OF ENQUIRY

Over a period of years from 1952 to 1960 we have attempted a review of the diabetic patients treated at the African hospital, Salisbury, so that some indication may be obtained of the type of diabetes seen in the African. A number of cases have been selected for a more intense study of their social, economic and dietary background to gain some knowledge of the status of Africans suffering from this disease.

AGE AND SEX INCIDENCE

Table I gives the age and sex of diabetic patients encountered in our series, the youngest patient being a schoolgirl of twelve years. The total African population figures for the greater Salisbury area are given for comparison, so that an indication may be obtained of the age groups in which diabetics are found.

Studies in the United States and Canada (Wilkerson and Krall, 1947; Kenny, Chute and Best, 1951; Kenny and Chute, 1953) show that the number of diabetics in each group rises steadily with age. Wilkerson and Krall (1947), for instance, found that in Oxford, Mass., the percentage of diabetics rose from 0.3 per cent. in the 15-24 age group to 9.7 per cent. in the 75 and over age group.

It should be pointed out that the African hospital in Salisbury draws its patients from an area which may stretch from 50 to 200 miles from Salisbury and it is not valid to compare the percentages of diabetes with the percentages

of total population unless it is appreciated that a higher proportion of the older age groups live in a rural area.

This is demonstrated by the fact that the percentages for males and females over the age of 50 years are 2.8 per cent. and 1.2 per cent. respectively for the greater Salisbury area and approximately 10 per cent. and 12 per cent. respectively for the country as a whole. However, even taking this into account, it is obvious that the diabetic patient tends to be in the higher age groups, as is found in other parts of the world.

SOCIOECONOMIC BACKGROUND

A more intensive study was carried out on a group of patients, not in all cases the same patients referred to elsewhere in this paper. (This group includes a girl of six years—the youngest African patient seen so far in Salisbury.) A series of questions were asked regarding their prediabetic diet and social backgrounds, so that an indication of the types of African developing this disease may be obtained.

There were twelve female and thirteen male patients in this series, of whom seven males and one female were re-admitted to be stabilised.

(a) *Original Home and Tribes of Patients*

Seven patients were Shona from areas within 50 miles of Salisbury, three were maNyika from the eastern border, and another six came from widely scattered areas of Southern Rhodesia and were from the Ndau, vaKaranga, baTonga

Table I

AGE AND SEX OF AFRICAN PATIENTS SUFFERING FROM DIABETES MELLITUS IN SALISBURY (1952-1960)

The estimated percentages of the total African population of Salisbury in the different groups are shown for comparison (Central African Statistical Office (1959).)

Age Group.	Diabetics				Total Population Percentage	
	Male		Female		Male	Female
	Number	Percentage	Number	Percentage		
0—9	0	0.0	0	0.0	15.5	37.8
10—19	3	4.3	1	3.4	16.8	19.4
20—29	19	27.2	6	20.7	36.8	25.4
30—39	16	22.8	6	20.7	21.1	13.6
40—49	15	21.4	8	27.7	7.0	2.6
50—59	9	12.9	5	17.2	2.5	0.9
60 and over	8	11.4	3	10.3	0.3	0.3
TOTAL	70	100.0	29	100.0	100.0	100.0

and maVenda tribes. There was one patient from the Senga tribe in Northern Rhodesia, and the remaining eight came from Nyasaland.

(b) Social Background

Gelfand (1959) suggested that the African should be placed in three social groups: Type I (preliterate) rural, primitive and unskilled labour exposed to tropical diseases and living on a traditional diet, with relatively little purchased food; Type II (semi-literate) semi-skilled or skilled worker basically living on a traditional African diet, but with many extras and comforts introduced by the Europeans; Type III (literate) the professional man who has assumed *in toto* the European way of life.

When the patients considered here are placed in these groups, we find that six of both the male and female patients fall into Type I and all the remainder into Type II. Type II diabetics are thus very much greater in numbers than may be expected from the present distribution of population. The numbers who are in Type III are as yet so few that it was most unlikely to find a patient in this group. Thirteen of the 25 patients were living in African urban areas, and of the twelve from rural areas only five dwell in African villages, thus following the traditional way of life. Three of them were women over 55 years, one was a master farmer of 60 years and the remaining woman of nearly 50 years had recently arrived in Salisbury from Nyasaland. The remaining patients from rural areas were a woman of 50 and a schoolgirl of twelve living on a Type II standard in a district not far from Salisbury, a prosperous storekeeper who was approaching a Type III standard, two cooks and a gardener who assisted with housework at European farms, and a Nyasa farm labourer of 19 who was of Type I standard and had rarely purchased processed food.

The patients of Type I standard in the urban areas were closely associated with the European economy and had greater access to quantities of purchased and processed food than is normally encountered with this group.

(c) Diet

The most highly educated patient, a clerk, aged 22, gave the following description of his prediabetic diet:

Breakfast: Tea—three teaspoonfuls of sugar per cup.

Midday: Scones, buns and aerated fruit drinks.

Evening: Bread, oranges and tea with sugar.

This man lived alone with his father and neither undertook any cooking. However,

periodic visits to restaurants were made where food similar to that eaten by Europeans was purchased.

The remainder were fond of sweet foods, particularly sweetened tea, which very often contained more than 1 per cent. sugar, without or with milk. Basically, however, the diet was of the traditional pattern, consisting of a midday meal of *sadza* (a heavy porridge prepared from maize meal), with a relish of green vegetables (sometimes with added peanut butter or fat), beans or a meat stew. The evening meal was similar in character. The additions to this traditional pattern consisted mainly of a breakfast which was not a normal meal in the past and consisted of sweetened tea, bread, margarine and jam. Food purchases, almost without exception, consisted of sugar, fat (dripping, cooking oil and margarine), bread, buns, sweets, milk (very often sweetened condensed) and mineral waters, particularly of the cola and orange types.

If the prediabetic diets of the patients are considered as a whole, a general picture is obtained of the traditional diet augmented with foods containing relatively large quantities of refined sugar and fats. It appeared that the older patients made less use of these added foods and the impression was gained that there were two types of diabetic: a more elderly diabetic who developed the disease irrespective of diet or social status, and the young middle-aged diabetic who probably came from families with a latent diabetic trait and whose dietary habits and rising social status have caused the disease to develop. However, it must be emphasised that this is pure speculation, particularly as in only one case was there a history of diabetes in other members of the family.

FORMS ASSUMED

We have experienced great difficulty in making our subjects appreciate the importance that some dietetic restriction is necessary. Should the food intake be restricted, they not uncommonly devise ways and means of procuring sweets, mineral waters and buns from other patients in the wards or more usually brought by relations and friends during visiting hours. Thus it becomes difficult to stabilise the patient on a correct amount of insulin. We doubt whether the dietetic habits can be radically altered for the average type of African we treat. It is difficult to compare the insulin requirements of the African with those of the European in the face of such difficulties and thus we can only confine our observations to trends or pointers.

The later the onset of the disease in the European, the milder is its nature. The form assumed in older sufferers is sometimes referred to as Type II diabetes, but the African diabetic who is over 50 years of age seems to require a fairly large dose of insulin, often over 50 units a day. Most of our European patients over 50 can generally be controlled on a much smaller dose each day. According to Cosnett (1959) (quoting Stocks, 1949), most of the diabetics in England and Wales require less than 50 units a day. In eleven of our cases who were 50 years and over the total daily insulin requirements in order to obtain a satisfactory control of the urine and blood sugar were: 40 P.Z. I, 15 Sol and 20 P.Z. I, 80 Sol, 120 Sol, 80 Sol, 40 Sol, 80 Col, 120 Sol, 40 P.Z. I—giving a mean of 69 units a day.

As in the case of the older diabetic, we have observed that the younger patient also requires a large amount of insulin and appears to display some degree of insulin resistance; however, they are always liable to attacks of hypoglycaemia if the tolerance is suddenly exceeded.

As we cannot assume that the patients adhered closely to dietary restrictions, it is difficult to compare the over 50 with the under 50 age group, but nevertheless we have quoted our doses for the lower age group in Table II. Only five subjects received 40 and under units of insulin daily, whereas 15 require 100 and over each day.

A more objective comparison of the severity of the diabetes may be made perhaps by studying the levels of the blood glucose in the glucose tolerance test. In Table III we compare the mean figures for the over and under 50 African age groups with a number of Salisbury Europeans. A statistical analysis of the figures has been carried out by group comparison and application of Students "t" test, and there was no

Table II

INSULIN REQUIREMENTS FOR THE AGE GROUPS UNDER 50

Age Groups, Years	No. of Subjects	Mean Daily Insulin, Units	Range, Units
Under 20	3	137	70-180
20-29	13	93	50-160
30-39	11	76	25-120
40-49	13	76	20-120
TOTAL	40	86	20-180

significant difference ($P > 0.1$) between the two African groups, although the difference between the younger group and the European was highly significant ($P < 0.01$) in all cases, even when allowance has been made for the differences in the two techniques. It is interesting to note that there is a far greater spread in figures in the African groups than in the European.

COMPLICATIONS

In Table IV are shown the nature and frequency of the complications found in our series. Although the blood sugar levels may be greater, some of the more serious complications associated with diabetes seem to be less frequent in the African; for instance, we did not meet a case with severe renal damage such as the Kimmelstiel-Wilson syndrome (intercapillary glomerulosclerosis) which Cosnett (1959) found to be common in the Natal Indian. Hypertension is encountered in our African diabetic subjects, especially amongst older patients, but its association with severe renal damage sug-

Table III

GLUCOSE TOLERANCE CURVES

Group	Number	Mean Blood Glucose mg/100 ml. and Standard Deviations					
		Fasting	½ Hour	1 Hour	1½ Hours	2 Hours	2½ Hours
African over 50 years	11	342.0	383.4	424.2	452.4	440.7	433.4
Mean age, 56.5 years		SD 189.9	SD 180.9	SD 191.6	SD 228.5	SD 201.8	SD 257.4
African under 50 years	23	282.3	348.4	401.1	412.1	384.5	336.5
Mean age, 32.2 years		SD 127.8	SD 170.2	SD 134.9	SD 141.2	SD 149.6	SD 145.9
Europeans	48	170.5	240.5	278.2	270.9	237.3	—
All ages		SD 65.21	SD 71.9	SD 78.2	SD 84.6	SD 83.6	—

Note.—The method used was that of Folin and Wu and, in the case of the European group, modified to give true glucose. The European figures will therefore be 9-16 mg. lower.

Table IV
COMPLICATIONS SEEN AMONGST AFRICAN DIABETICS

Complication	Total Number of Diabetics	Complicated Cases	Percentage
Hypertension (over 180/100)	51	16	31
Cataracts	99	7	7
Ketosis (coma or precoma)—Male	70	14	20
Female	29	3	10
Over 40 years	48	3	6
30-39 years	22	2	9
20-29 years	25	11	44
Under 20 years	4	1	25
All patients	99	17	17
Lung abscess	99	1	1
Ulcer of the vulva	29	1	3
Tropical ulcer of foot	99	1	1
Dysuria	99	1	1
Pulmonary tuberculosis	99	1	1
Gangrene	99	1	1
Pancreatic calcinosis	99	1	1

gestive of either papillitis, intercapillary glomerulosclerosis or pyelonephritis is apparently rare.

Hypertension was severe in two cases—a male of 55 with blood pressure at 230/160 and a female of 50 at 210/135. In a further two it was moderate, but in the remainder it was mild. Circulatory complications appear to be rare and this may be related to the infrequency of atheroma in the African. Gangrene of an extremity was seen only once, and again this may be of some significance when it is compared with a higher incidence in the European.

The most frequent eye complication encountered in our series was that of cataract. It occurred in young people who first sought treatment because of failing vision and were unaware of their diabetic state. But retinitis would appear to be uncommon, although we believe that further experience might cause us to revise our opinion.

Cosnett (1959), who did not include milder cases with absent ankle jerks as the only abnormal finding, reported that peripheral neuritis was found in 16.9 per cent. of his Indian patients. In our series we did encounter a number of diabetics who had absent ankle or

knee jerks, but none complained of severe pain in the limbs and sensory changes were not seen. There was one male African, aged about 48 years, who had a trophic ulcer of his left foot. A diabetic with amyotrophy or an isolated nerve palsy was not encountered.

On the 17 cases with hyperglycaemic coma or precoma, five died (three male and two female). All five had high blood sugar levels (500-1,280 mg/100 ml.). The recognition of diabetic coma or precoma is fairly simple and we doubt if many cases are missed in our African hospitals. Usually the smell of acetone on the breath is easily detected, the subject is dehydrated, has lost a good amount of weight and his eyes and cheeks are sunken. His tongue is dry and the breathing becomes deep and sighing as he passes into the stage of coma. The urine contains large amounts of sugar and ketone bodies and the blood sugar level is usually well elevated. The blood sugar estimations done at the time of admission of these subjects varied from between 272 and 1,280 mg/100 ml., most of the levels being over 450 mg/100 ml. It is equally important to recognise the precoma case; warning symptoms include an increasing constipation and often abdominal pain and discomfort

for a few or more days before the onset of the comatose state.

It is clear from our observations that diabetic acidosis occurs mostly (as in the European) in the younger age groups, who respond satisfactorily and who can be controlled fairly well with insulin. This is quite different from the J-type of diabetes described by Hugh-Jones (1955) among the Negroes of Jamaica and later by Cosnett (1959) among the Indians of Natal. This type of diabetic, which rarely develops ketosis and is resistant to insulin, has not been met as yet in the Rhodesian African. Our diabetic subjects are liable to develop readily attacks of hypoglycaemia should the correct amount of insulin be exceeded. We are also doubtful whether the "Variant K" suggested by Shaper (1958) is seen in Rhodesia. As can be seen from Table V, a relatively large percentage of the age groups in which Type I diabetes is found develops ketosis.

In our series no case presented for treatment because of a boil or carbuncle, and we have already referred to the rarity of serious renal complication. Whether pyogenic infection in the African diabetic is infrequent is difficult to judge from the literature, but our impressions

are that it is uncommon. Further, pulmonary tuberculosis would appear to be a rare complication. It does occur, but probably not often, and in the present series there was one case. We also carried out a blood sugar estimation on 60 consecutive Africans found to have active pulmonary tuberculosis, but so far have not met any suffering from diabetes. It may be that we are encountering mostly the predominantly acute forms of pulmonary tuberculosis in relatively young subjects, and that if the patients were followed up for a longer time diabetes may appear in them.

The frequency of changes found in the liver of the average African has suggested that this organ may be important in explaining differences between the African and European diabetic. However, we have no reason to assume that it plays any part in the etiology of diabetes. In the 29 cases in whom liver function tests were carried out, cirrhosis of the liver was found in two. Another three patients had liver slightly enlarged, but the surface felt smooth and the edge soft.

Serum transaminase determinations (King, 1958) were carried out on a number of diabetics, but were found to be abnormal only when there was clinical evidence of cirrhosis.

Other biochemical estimations, including serum cholesterol, serum amylase and fat in the stools, were carried out in some of the cases in our series, but results were generally within normal ranges. There was little to indicate that chronic pancreatitis was often associated with diabetes and only one typical example of pancreatic calcinosis was detected on radiological examination of the abdomen.

Serum iron determinations have been made on a small number of cases (three male, five female) and the mean figure was 111 ug/100 ml. (range, 64-198 ug/100 ml.).

SYMPTOMATOLOGY

It is often difficult to obtain a reliable history from the African, but despite this great drawback to accuracy a certain pattern is discernible. Reference to Table V shows the main symptoms recorded. The African diabetic we have met usually presents with a classical account—namely, thirst, increase in appetite and polyuria—and by the time he appears at the hospital or clinic he has lost a great deal of weight. In our experience few present because of infection, whether this be pyogenic, tuberculous or renal. Pruritus vulvae is a frequent complaint amongst the female diabetics. There is nearly always a history of good appetite. It is not uncommon

Table V

SYMPTOMS REPORTED BY 99 DIABETIC PATIENTS

Symptoms	Number
Thirst	46
Loss of weight	32
Weakness	10
Loss of appetite	2
Abdominal pains (no coma)	26
Coma or precoma	17
Cataract	7
Hypoglycaemia (insulin)	4
Dysuria	5
Headache	6
Diarrhoea	3
Pains in: legs	13
joints	3
chest	4
Septic lesions on body	5
Pruritis vulvae (29 women)	5 (17%)
Constipation	3

for abdominal pain and increasing constipation to be experienced for several days before the coma commences in those admitted with diabetic acidosis (coma or precoma). Vomiting is also a common and early feature of coma.

ATYPICAL FORMS

There were three cases (not included in the present series) who, during the period under review, showed a lag curve. However, we have not yet met an African subject who had renal glycosuria, although this may well not be the experience of others. We have seen a number of Africans who recover spontaneously from a diabetic state, but we are not certain how often this occurs; our impression is that it is relatively uncommon.

We have observed very occasionally an interesting form of hyperglycaemia which is being included here largely to draw attention to it. The subject is usually admitted critically ill in coma and, besides a high blood urea, the sugar of the blood is also raised, but no sugar or acetone is detected in the urine. Included in our series is a male (Douglas), aged 50 years, who was admitted on the 11th December, 1959, in a semi-conscious state; his state of nutrition was good, he had a healthy skin and the urine contained no acetone or sugar, although 1+ albumin was reported. Further investigation gave the findings as follows: blood pressure, 110/70; haemoglobin, 54 per cent. (8 g. per cent.); white cell count, 16,000 (polymorphs 80 per cent., lymphocytes 20 per cent.); CO₂ combining 29 per cent.; blood urea, 200 mg/100 ml. (on the 12th December, 1959); blood sugar, 200 mg/100 ml.; cholesterol, 110 mg/100 ml.

A drip saline was given in the evening after his admission. This was continued for three days and he remained critically ill for this period. Each day he ran a moderate fever of 100° F. Blood urea figures for 14th and 15th December were 115 and 191 mg/100 ml. respectively and his urine on culture showed a scanty growth of lactose coliform fermenting organism. The serum amylase was four Wohlgemuth units.

On the 14th December, 1959, the patient was treated with 20 units of soluble insulin twice daily and after two days he was showing definite signs of improvement. Each day saw a steady recovery in consciousness, and by the fifth day he was able to eat. At this stage the blood sugar tolerance curve showed a mild diabetic curve (fasting 100 mg/100 ml. and half-hourly intervals 240, 226, 205, 194 mg/100 ml.). The patient made a good recovery and after about four weeks in hospital he was dis-

charged. His insulin was gradually withdrawn and none was given in the last two weeks of his stay in hospital. The blood sugar levels were now normal.

DISCUSSION

No major difference in the forms assumed by diabetes mellitus in the African when compared with those in the European were found by us. We did not observe the interesting J-type variant recorded among the Negroes of the West Indies by Hugh-Jones (1955) or the variant K described by Shaper (1958) in Uganda. The main patterns of diabetes as we see it correspond very closely with those met with in the European, with perhaps a few minor differences which might be expected in a population largely composed of relatively young males who come to work in the industries and factories.

The mode of onset of diabetes in the African corresponds to that which one expects in the disease. Most of our patients complained of thirst, polydipsia, pruritis and weakness. Possibly fewer seem to present because of an abscess or boil or of a urinary infection. But what has impressed us so far is the apparent rarity of certain well-established diabetic complications, especially neuropathy, advanced renal damage and possibly also retinoblastitis. The rarity of advanced atherosclerosis in the African might account for the apparent greater rarity of certain complications associated with atherosclerosis such as gangrene.

It is also our impression that tuberculosis rarely complicates diabetes in the African. In the European, tuberculosis seems to select the younger diabetic, and as most of our tuberculous are in these age groups the infrequency of diabetes among them was perhaps surprising.

As in the European, hyperglycaemic coma is mostly met with in the younger age groups, when they respond readily to insulin. Although our African diabetics seem to require larger amounts of insulin at all ages than the European, they are not insulin-resistant, and if this amount corresponding to the need of the particular patient is exceeded they readily develop hypoglycaemia.

Whilst the onset of diabetes in the African does not differ significantly from that of the European, the African diabetic appears to be more severely affected than the European, in that the degree of hyperglycaemia appears to be greater and the African seems to require a larger daily dose of insulin to meet his requirements. We have, however, pointed out that if the African adhered more carefully to the dietetic regime laid down for him, it is probable

that smaller amounts of insulin would be needed, but the explanation might be entirely different. It might be tempting to blame the liver, which is so often affected in the African, but of this we have little proof. The African who has cirrhosis does not display any special tendency to develop diabetes, although such a liver may cause the diabetes to be more resistant.

The lower incidence of diabetes mellitus in the African may be accounted for by the apparent lesser frequency with which endocrinal disorders are met in him than in the European. Thyrotoxicosis, pituitary and adrenal disorders—all of which may be associated with the diabetic state—are apparently uncommon and it is possible that the endocrine organs of the Africans are more resistant to change. On the other hand, the indications are that the disease attacks the more "emergent" type of Africans whose environment and diet have changed quite considerably from the traditional, although exceptions to this are found in the older patient. Shaper's (1959) work on pancreatic calcinosis in the African has drawn attention to the effect that chronic protein malnutrition may have on this organ and the relationship this may have with diabetes mellitus.

Edington (1957), in Ghana, claimed that haemosiderosis, which he finds not uncommonly in the African, is sometimes seen with diabetes mellitus and he suggests that this is due to a deposit of iron pigment in the pancreas as in haemochromatosis. Our experience in Southern Rhodesia is that a small number of cases give the biochemical and chemical appearance of haemochromatosis. Similarly, pancreatic calcinosis is only rarely found in Southern Rhodesia. We should expect to meet far more diabetics in the African than we do if the disease resulted from chronic protein malnutrition. It seems likely that the disease follows upon a number of factors, of which genetical, environmental and nutritional are perhaps the most important, but all we can say of the African is that a high cereal, low protein diet does not seem to predispose individuals to diabetes mellitus.

In only one subject could we demonstrate a familial tendency in the disease, but it is quite likely that if more was known of family ailments by Africans, more cases would come to light. It is safe to say that the average African at present has little conception of the diseases from which his immediate relatives suffer.

SUMMARY

(1) A study of the nature of diabetes seen in African patients in Salisbury is presented. The socioeconomic background shows that most

patients come from groups who work in the European economy and whose diet has been altered to include more foods containing, in particular, refined sugar and fats. There is also a group composed largely of elderly diabetics whose way of life appears to have been little affected by the introduction of new foods.

(2) The clinical types encountered in Rhodesia correspond very closely to that of the European pattern. No variants such as J or K types were found. The African diabetics may require more insulin than the European in order to be stabilised, but this may be due to his lack of understanding of the necessity to follow a strict dietary regime. At the same time, the level of blood sugar was found to be higher than in a European group and this may perhaps be the reason for this difference.

(3) Although the insulin requirements of the African appeared to be high, hypoglycaemia coma developed if the requirements were exceeded.

(4) The symptoms of diabetes appear to be the same for the African and European, the main features being thirst, polyuria, weakness, loss in weight and pruritus vulvae; but complications showed certain differences, such as the infrequency of pulmonary tuberculosis, gangrene and intercapillary glomerulosclerosis.

(5) One atypical case with hyperglycaemia is described.

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