PRELIMINARY REPORT:

MONITORING DIABETES CONTROL

BY

S. K. Owusu

Department of Medicine and Teherapeutics,
Univertiy of Ghana Medical School, Accra.

Summary

Twenty (20) Non-Insulin Dependent Diabetic (NIDD) and twenty-four (24) Insulin Dependent Diabetic (IDD) patients were studied to detemine the best blood test(s) for control of their diabetes. In the NIDD groups, a fasting blood sugar of 7.1 mmol/l or less, or a 2-hour post prandial (post breakfast) blood sugar of 7.7 mmol/l or less, was found to be an accurate predictor of good control throughout the day (24 hours). For the IDD group, a fasting blood sugar of 7.1 mmol/l or less and a 2-hour post prandial (post breakfast) blood sugar of 7.7 mmol/l or less, are likely to indicate a good 'control' if the patient is on twice daily injections of Insulin.

Key Words: Diabetes Mellitus; Insulin; Blood Sugar.

Introduction

Most physicians now agree that a good control of diabetes is desirable. The problem has been how to achieve it without the severe price of hypoglycaemic attacks and measurements that are acceptable for regulation. Fasting blood sugar estimation has been used in the past to monitor 'control' of non-insulin dependent as well as insulin dependent diabetes. The Fasting Blood Sugar has been found to correlate so well with glycosylated haemoglobin (HbA_1) levels in non-insulin dependent diabetes (NIDD) as to make measurement of HbA_1 levels in the monitoring of degree of diabetic control unnecessary. Its value in insulin dependent diabetic (IDD) patients has however been questioned since blood sugar in such patients may vary by 20 mmol/l or more in a single day. Fasting blood sugar or 'random' blood sugar values in such patients have been found to correlate poorly with HbA_1 and are said to be an unreliable guide to changes in treatment[1]. However, alternative suggestions have not been made. This study was designed to find such an alternative and to see if it could be applied to both types of Diabetes as a guide to 'control'.

Patients and Methods

Over a 6-month period, diabetic patients attending our clinic were requested to do 3 blood tests on the day before their attendance at the clinic. These tests were - (a) Fasting Blood Sugar, (b) Two-hour post prandial (post breakfast) blood sugar, (c) Two-hour post prandial (post lunch) blood sugar. Those patients with a fasting blood sugar of 7.7 mmol/l or less, on not less than three consecutive visits without symptoms suggestive of hypoglycaemia were selected and other blood sugar measurements analysed. A fasting blood sugar of 7.7 mmol/l was used as a cut-off point for 'control' because it is customarily used as the 'cut-off' point.

Results

Tables 1 and 2 show the Fasting Blood Sugar and 2-hr postprandial sugar levels of patients on either oral hypoglycaemic agents or insulin treatment.

Discussion

Table 1 shows clearly that apart from case 2, when the fasting blood sugar is 7.1 mmol/l or

Prof. Owusu's present address is:

Al Salam Hospital, Sadah
Yemen Arab Republic.

Table 1

Case No	Fasting Blood Sugar (FBS) (8-9 AM) mmol/l	2-Hour Post Prandial Blood Sugar (10-11 AM) mmol/l	(3-4 PM) mmol/l
1	5.2	4.6	4.1
2	6.0	13.6	12.7
3	6.6	7.7	8.6
4	6.8	7.0	7.2
5	5.6	3.5	7.5
6	6.1	6.4	7.0
7	5.7	5.4	6.5
8	6.3	5.7	7.5
9	6.5	6.6	7.1
10	4.7	5.2	4.1
11	6.9	4.5	4.1
12	6.9	7.4	7.7
13	6.9	7.4	8.3
14	7.1	4.6	4.1
15	7.2	14.5	21.3
16	7.3	9.3	9.5
17	7.5	10.3	10.3
18	7.5	8.8	7.3
19	7.6	7.5	7.2
20	7.6	9.6	23.1

Fasting Blood Sugar (FBS) and 2-hour Post-prandial blood sugar levels in patients on treatment with oral hypoglycaemics.

Table 2

Case No.	Fasting Blood Sugar (FBS) (8 - 9 AM) mmol/l	2-Hour Post Prandial Blood Sugar (10-11 AM) mmol/l	(3-4 AM) mmol/l	Frequency of Insulin Treatment*
1	6.2	17.8	12.8	Twice daily
2	3.7	5.1	8.3	Twice daily
3	5.3	3.9	9.8	Twice daily
4	2.5	11.8	7.2	Twice daily
5	7.0	13.2	10.2	Once daily
6	3.2	10.3	8.7	Once daily
7	5.7	8.9	17.8	Twice daily
8	4.1	11.5	18.8	Once daily
9	2.1	7.7	9.8	Twice daily
10	5.1	12.2	24.7	Twice daily
11	6.1	19.2	19.7	Twice daily
12	4.0	14.0	17.9	Twice daily
13	2.4	10.8	20.6	Twice daily
14	3.3	13.8	16.3	Twice daily
15	6.1	13.7	11.1	Once daily
16	5.5	9.2	19.8	Twice daily
17	6.6	4.9	6.4	Twice daily
18	4.7	22.6	31.6	Twice daily
19	4.7	6.8	8.8	Twice daily
20	5.4	5.8	15.9	Twice daily
21	4.7	11.3	21.7	Once daily
22	2.7	12.9	15.8	Twice daily
23	3.7	5.3	6.6	Twice daily
24	7.0	13.2	10.2	Once daily

*Patients on twice daily Insulin treatment were on NPH (Isophane) + regular (Soluble) Insulin. Those on once daily were on Isophane only.

less, the post prandial blood sugar does not exceed 8.6 mmol/l; the 2-hour post prandial (post breakfast) blood sugar in fact never exceeded 7.7 mmol/l - a highly acceptable situation. Such a situation is, however, not always present when the fasting blood sugar is 7.2 mmol/l or more. This confirms the previous observation that in maturity-onset diabetics, the fasting blood sugar concentration accurately predicts the mean blood concentrations during the following 24 hours. The threshold for the fasting blood sugar concentration appears to be 6-7 mmol/l; post prandial blood sugar never exceeding 11.5 mmol/l[3]. In this study the post prandial blood sugar never exceeds 8.6 mmol/l, apart from one case.

A fasting blood sugar of 7.1 mmol/l or less in insulin dependent diabetic (IDD) patients does not, however, have such a predictable value for blood sugar 'control'. What is apparent from Table 2 is that if the fasting blood sugar is 7.1 mmol/l or less and the 2-hour post prandial (post breakfast) blood sugar does not exceed 7.7 mmol/l then the afternoon post prandial blood sugar is unlikely to exceed 10 mmol/l and, therefore, the patient is unlikely to show glycosuria throughout the 24 hours (note Cases 2, 3, 9, 17, 19, 23). The patient is, therefore, likely to be reasonably well controlled throughout the day provided Insulin is given twice daily.

Quite a number of diabetic clinics have stopped using the fasting blood sugar as a means of assessing 'control' of Diabetics because it is thought that the 2-hour post prandial blood sugar is more accurate or useful, irrespective of its convenience to patients and laboratories. From this study it is observed that for NIDD, either test is useful in determining 'good control'. Which of them is adopted for any diabetic clinic should be a matter of convenience for patients and/or laboratories. For the IDD patients a fasting blood sugar and a 2-hour post prandial (post breakfast) blood sugar are both necessary to determine 'good control'.

References

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