GLYCAEMIC CONTROL IN DIABETES MELLITUS

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ABSTRACT

Objective: To evaluate the degree of glycaemic control among diabetic patients.

Methods: The study included 156 diabetic patients (64 with insulin–dependent diabetes mellitus (IDDM) and 92 with non insulin–dependent diabetes mellitus (NIDDM)), and 120 control subject. The parameters measured were fasting blood glucose (FBG) and the level of glycated haemoglobin (Hb A1c).

Results: HbA1c level was significantly higher among diabetic patients (both IDDM and NIDDM) compared to controls (P<0.001). Also, 43.8% of IDDM patients and 63.0% of NIDDM patients were in poor glycaemic control.

Conclusion: Substantial proportion of diabetic patients are in poor metabolic control, and hence, more prone to early diabetic complications.

Key words: Diabetes mellitus, glycaemic control, HA1c.

INTRODUCTION

 Diabetes mellitus is a chronic metabolic disease associated with disturbances in the metabolism of glucose, protein and fat resulting from absolute or relative insulin lack1,2. Insulin deficiency plays a major role in the metabolic disorders in diabetes, and hyperglycaemia contribute greatly to the complications of diabetes3. Diabetes occurs world wide and the prevalence of both type 1 and 2 of Diabetes mellitus is increasing2,4. It is estimated that it will affect more than 20 million people by the year 20205. Diabetes mellitus is Diabetes is a major public health problem, especially among older individuals. Individuals with diabetes are at high risk for dyslipidaemia, cardiovascular disease (CVD), and mortality5-7. Diabetes mellitus is one of most important modifiable risk factors of coronary heart disease (CHD)5. Also, it increases the risk of cardiac, cerebral and peripheral vascular disease 2-7 fold3. Glycation of haemoglobin (Hb) refers to a series of stable minor components formed normally between Hb A and glucose or its metabolites. These components are collectively known as Hb A1. At least 4 Hb A1 fraction have been identified, and Hb A1C is the most important one accounting for 3-6% of the total Hb in normal people9. Measurement of glycated Hb level has been successfully used in monitoring diabetic patients. It is known that Hb A1C formation depends on the mean blood glucose levels10,11. The aim of this study was to evaluate the degree of glycaemic control among diabetic patients by measuring Hb A1C concentration.

PATIENTS & METHODS

In this prospective study, 156 diabetic patients were included. They were 64 patients with insulin–dependent diabetes mellitus (IDDM), 28 males and 36 females, their age ranged from 8-60 years (mean : 34.5), and 92 patients with non insulin–dependent diabetes mellitus (NIDDM), 43 males and 49 females, their age ranged from 30-70 years (mean: 53.4). They were diagnosed by consultant physicians. In addition, 120 apparently healthy subjects were included as a control group. They were 35 males and 85 ....

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females, 13-76 years of age (mean: 36.7). Fasting blood glucose (FBG) was carried out using enzymatic kit from bioMeriux, France. Estimation of Hb A\textsubscript{1c} level was preformed by ion - exchange HPLC using the VARIANT\textsuperscript{TM} program form BIO-RAD. Quatity control sera from bioMerieux were included in each assay batch for all measured parameters. Diabetic patients were considered in poor metabolic control when Hb A\textsubscript{1c} > 8.0%\cite{12,13}. Statistical analysis was carried out using the analysis of variance (ANOVA). P<0.05 was considered statistically significant.

RESULTS
Table 1 summarizes the results. Hb A\textsubscript{1c} concentration were significantly higher among patients with IDDM and NIDDM compared to control subjects (p<0.001). As shown in Table 2, 56.2% of patients with IDDM were in good glycaemic control and 43.8% in poor metabolic control. The comparative figures in NIDDM were 37.0% and 63.0% respectively.

DISSCUSSION
Glycated Hb is usually used as a supplement to blood glucose estimation to monitor the overall degree of diabetic control. Glycation occurs gradually for about 2-3 months, recurring early in their development and remain constant until their death. That’s why Hb A\textsubscript{1c} has been used in the monitoring of diabetics as an index of long-term glycaemic control for the last 6-8 weeks\cite{2}. Some studies evaluated the glycaemic control depending upon FBG estimation\cite{14}. However, single or serial blood glucose estimations cannot be used for such purpose and only reflect the degree of glycaemia at the moment of sampling.

This study clearly shows that Hb A\textsubscript{1c} level is markedly elevated among diabetic patients than controls, with the overall mean Hb A\textsubscript{1c} level among both IDDM and NIDDM patients in the range of poor metabolic control. Such finding indicate that diabetic patients are at exceedingly high risk of cardiovascular complications than normal people. As presented in Table 2, considerable percentage of IDDM and NIDDM patients were in poor glycaemic control. This implies that such patients are at risk of early diabetic complications, accelerated athersclerotic disease, and also, and increased cardiovascular disease risk. There are sustained racial differences in the nature of diabetes, including vascular risk factors\cite{15}. urban African Americans with diabetes more likely to have suboptimal glycemic control. Differences in age, sex, and insurance type seemed to explain some of the disparities\cite{16}. Differences in glycemic control by race were associated with disease severity, health status, and poorer quality of care\cite{17}. A close correlation has been observed between glycaemic control and serum lipid levels in patients with IDDM\cite{18,19}. Untreated or inadequately treated IDDM patients shows a variety of dyslipidaemia\cite{20}. Therefore, these patients are considerablly prone to accelerated athersclerotic disease. Adequate treatment results in favorable effects on lipid profile\cite{21,22}. On the other hand, NIDDM is associated with poor glycaemic control and atherogenic changes of lipid profile\cite{23,24}. Type 2 diabetes and elevated plasma lipid levels are important independent risk factors for cardiovascular disease and coronary heart disease\cite{24}. Diabetes management led to favorable changes in HDL-C and triglyceride levels, but improved glycemic control and weight loss had no independent effect on LDL-C concentration. Initiation of therapy to treat high LDL-C levels should be considered early in the course of diabetes management to reach recommended targets and reduce the risk of cardiovascular complications\cite{25}. Several therapeutic modalities have been shown to be beneficial in improving atherogenic lipid profile, including metformin, metformin/gluburide, ezetimibe, rosuvastatin, atrovastatin, lovastatin, pravastatin, simvastatin and fenofibrate\cite{24,26-31}. The later is a valuable lipid lowering agent in patients with
atherogenic dyslipidaemia. Furthermore, it has been found that combination lipid lowering therapy is more effective than statin monotherapy. It has been suggested that pravastatin therapy result in a considerable reduction in the hazard of becoming diabetic. By lowering plasma triglyceride levels, pravastatin therapy may favorably influence the development of diabetes. However, worsening of metabolic control deteriorates lipid and lipoprotein abnormalities and increases cardiovascular complications.

In conclusion, diabetic patients showed high Hb A1c level with considerable proportion in poor glycaemic control. This necessitates active intervention toward strictly adequate treatment to avoid early and irreversible diabetic complications.

Table 1. FBG and Hb A1c level among diabetic patients and control subjects.

<table>
<thead>
<tr>
<th>Group</th>
<th>FBG (mg/dl)</th>
<th>Hb A1c (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IDDM</td>
<td>254.5 (115.9)*</td>
<td>10.9 (4.8)*</td>
</tr>
<tr>
<td>NIDDM</td>
<td>182.4 (86.5)*</td>
<td>8.8 (2.8)*</td>
</tr>
<tr>
<td>Controls</td>
<td>90.3 (15.4)</td>
<td>4.2 (0.94)</td>
</tr>
<tr>
<td>Males</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IDDM</td>
<td>280.2 (126.4)*</td>
<td>12.8 (6.1)*</td>
</tr>
<tr>
<td>NIDDM</td>
<td>189.5 (69.7)*</td>
<td>9.3 (3.0)</td>
</tr>
<tr>
<td>Controls</td>
<td>95.1 (25.0)</td>
<td>4.4 (0.97)</td>
</tr>
<tr>
<td>Females</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IDDM</td>
<td>248.7 (105.3)*</td>
<td>9.9 (3.4)*</td>
</tr>
<tr>
<td>NIDDM</td>
<td>186.0 (64.9)*</td>
<td>8.3 (2.6)</td>
</tr>
<tr>
<td>Controls</td>
<td>88.2 (12.8)</td>
<td>4.3 (0.94)</td>
</tr>
</tbody>
</table>

Values are expressed as Mean (SD)
*: P< 0.001 (controls vs IDDM and NIDDM)

Table 2. glycaemic control among diabetic patients.

<table>
<thead>
<tr>
<th>Glycaemic control</th>
<th>IDDM</th>
<th>NIDDM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Good</td>
<td>No.</td>
<td>%</td>
</tr>
<tr>
<td></td>
<td>36</td>
<td>56.2</td>
</tr>
<tr>
<td>Poor</td>
<td>28</td>
<td>43.8</td>
</tr>
<tr>
<td>Total</td>
<td>64</td>
<td>100.0</td>
</tr>
</tbody>
</table>

REFERENCES


السيطرة الأيضية عند مرضى السكر

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الخلاصة:

الهدف: تقييم مستوى السيطرة الأيضية عند مرضى السكر

الطريقة: شملت الدراسة 56 مريضاً، منهم 14 مريضاً مصاباً بالسكر المعتدل على الإنسولين و 42 مريضاً بالسكر غير المعتدل على الإنسولين، بالإضافة إلى 10 مرضى مصابين بمرض السكري في الدمشوقي. تم قياس مستوى الدم من خضاب الدم type 1c(HbA1c) ومستوى خضاب الدم نوع A1c.

النتائج: كان مستوى HbA1c عاليًا بشكل معنوي عند مرضى السكر (في كل النوعين) مقارنة بالأخير. وكان هناك 43.8% من مرضى السكر المعتدل على الإنسولين و 23.4% من مرضى السكر غير المعتدل على الإنسولين بدرجة سوء السيطرة ضعيفة P<0.001.

الخاتمة: نسبة نسبة من مرضى السكر في درجة سوء من السيطرة الأيضية مما يجعلهم أكثر عرضة للمضاعفات المبكرة للسكر.

مفاتيح الكلمات: داء السكر، السيطرة الأيضية، خضاب الدم نوع A1c

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