

Audit of Glycemic Control of Patients with Diabetes Mellitus in Central Hospital Sakaka Al-Jouf, Saudi Arabia

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INTRODUCTION

Accurate measurement of chronic (time averaged) glucose control is one of the major difficulties in managing diabetic patients. Even patients with mild disease may show large fluctuation in blood glucose. And single glucose determinations may correlate poorly with mean blood glucose levels. Measurement of glycated hemoglobin has gained acceptance as a good assessment of diabetic control.¹

Glycation does not occur during biosynthesis but is a non-enzymatic, two-stage condensation of glucose with various amino group of hemoglobin molecule. Glycation occur slowly throughout the life span of the mature red blood cell and is dependent on the circulating level of blood glucose. Therefore it represents the time averaged (chronic) blood glucose level. Two advantages are evident in measuring glycated hemoglobin:²

- A- A single determination can replace multiple glucose determinations performed at timed intervals.
- B- Glycated hemoglobin levels, determined by affinity chromatography are not affected by labile fraction or physical exercise.

Choice of test:

Glycated hemoglobin preferably its major component HbA1c, is currently recommended as the first line of test for the long term monitoring of glycemic control in patients with diabetes mellitus. Fasting plasma glucose is also useful in patients with non-insulin dependent diabetes mellitus, but fructosamine is no longer recommended.³

Methodology

Affinity column chromatography was used, which has several characteristics that increases the accuracy, specificity and linearity of glycated hemoglobin determination. The method is not affected by moderate fluctuation in temperature and pH, or by presence of abnormal hemoglobin. A significant advantage of affinity chromatography is the lack of interference by labile glycated hemoglobin and carbamylated hemoglobin in (uremic patients). The labile GHb is a transition stage in the formation of glycated hemoglobin that changes in response to acute changes in blood glucose and increases HbA1 quantitations determined by cation exchange chromatography or electrophoresis. In uremic patients there is condensation of urea-derived cyanate with the N terminal amino group on the beta chain of HbA. This urea bound hemoglobin elutes with HbA1 on cation exchange column producing falsely elevated results.⁴

Participants

- Biochemistry Department of Sakaka Central Hospital Saudi Arabia.
- Outdoor and indoor diabetic patients.
- It was the retrospective audit of 4, months.
- 3 cc of blood was taken in EDTA tube. The sample was processed same day or incubated at +2 to +4°C, to process in the next batch.

Precision and bias

- 1- Strict quality control was maintained through GLYCO-TEK normal and abnormal controls.
- 2- The coefficient of variation of controls was 2-3.1%, while the Coefficient of variation of diabetic patients was 1.1-2.1%.

RESULT

HbA1c of 134 patients was done during 4 months, out of 134 patients 72(54%) were male and 62(46%) were female. Mean HbA1c of male subjects was on the higher side i.e., 10% as compared to female i.e., 9.4%. Mean age of male was 55y and that of female was 48y. About 82% of male patients and 78% of female patients were having uncontrolled diabetes mellitus. And total 80% of patients were having uncontrolled diabetes mellitus, while in only 20% of patients diabetes mellitus was controlled (Table 1). Age range of patients was 17-90y. 22% were below 40y, 48% were between 40 to 60y, where as 30% were above 60y of age. Under the age of 39y, 67% were having uncontrolled diabetes, similarly between 40 to 60y of age 81% were having uncontrolled diabetes, while above 60y of age 88% patients were having uncontrolled diabetes. Only 23% below 39y, 19% between 40-60y and only 12% above 60y of age have got controlled diabetes (Table 2).

Table 1: Table showing male and female number, their mean HbA1c, mean age and their control of diabetes.

Parameters	Male	Female	Total
Total No	72 (54%)	62 (46%)	134 (100%)
Mean HbA1C	10%	9.4%	9.8%
Mean age (Years)	55	48	51
HbA1c < 7	13 (18%)	14 (22%)	27 (20%)
HbA1c > 7	59 (82%)	48 (78%)	107 (80%)

Table 2: Table showing age range, and control of diabetes in respective age range.

Age range	17-39y	40-60y	61-90
No.	30(22%)	64(48%)	40(30%)
HbA1c > 7	20(67%)	52(81%)	35(88%)
HbA1c < 7	10(23%)	12(19%)	5(12%)

Figure 1 is showing increase in % of uncontrolled diabetes with the increase in age of local population.

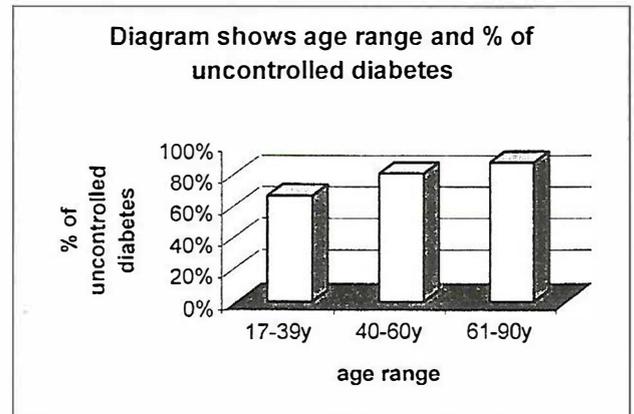


Fig. 1. Increase in % of uncontrolled diabetes with the increase in age of local population.

CONCLUSION

- After the introduction of HbA1c and the audit of its results, it was concluded that, all most above 80% of patients which were previously monitored, of their blood glucose levels by their FBS or RBS, were having uncontrolled diabetes mellitus. This uncontrolled diabetes was probably,
- Due to high prevalence rate of DM in the population of Arabian Peninsula.
- Non-compliance of treatment by the patient, due to the local life style of the region, eating habits, educational status, and most occupations are sedentary.^{5,6}
- Pattern of results, and diagram shows high prevalence of NIDDM in this population.
- Findings showed that HbA1c is better investigation to monitor the diabetic patients.
- The use of cumulative reports for HbA1c results is encouraged.
- The provision of with in or pre clinical results have advantages and is encouraged.
- HbA1c should be measured once yearly for every diabetic patient as part of an annual review. Measurement more frequently than every two months should generally be discouraged, except in specific situations such as the monitoring of diabetic pregnancy.⁷

A recent survey of methods for monitoring

glycaemic control in use in Wales, presented to an audit meeting in May 1995, showed wide variation in practice. In view of the need for reliable, consistent and comparable methods for monitoring glycaemic control, a more extensive meeting to review this topic and audit practice was held in February 1996. A further re-audit in March 1999 showed that all laboratories in Wales were now using HbA1c as their first line test for the long term monitoring of glycaemic control.⁸

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