

Glycemic Control of Type 2 Diabetes Mellitus

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Objective: To determine the frequency of use of HbA1c level as an indicator for type 2 diabetes control and to identify the Glycaemia control among type 2 diabetic patients.

Design: A retrospective study.

Setting: Dair Health Center .

Method: Medical records of all diabetic patients were reviewed for having a test result of HBA1c and for the average level of this test from first of January till the end of December 2004. The time of record review was from first of April 2005 till the end of May 2005.

Result: Among 383 type 2 diabetic patients treated at Dair Health Center during 2004, only 178 cases (46.5%) had HBA1c test. Out of these, twenty cases (11.2%) had an HBA1c level of 7% and below . There was no statistically significant difference between the mean of HBA1c for males and females. There was no statistically significant difference between the mean of HBA1c and the type of treatment.

Conclusion: HBA1c was underused as an indicator for diabetic control in Dair health center. Furthermore, more stress on strict Glycemic control needs to be emphasized.

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Type 2 diabetes mellitus is a chronic disease which results from insulin resistance, mainly caused by obesity, with a defect in compensatory insulin secretion.

Glycosylated hemoglobin is abnormally high in diabetics with chronic hyperglycemia and reflects their metabolic control. It is produced by nonenzymatic condensation of glucose molecules with free amino groups on the globin component of hemoglobin. The major form of glycohemoglobin is termed hemoglobin A1c, which normally comprises only 4-6% of the total hemoglobin¹.

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Improving glycemic control in patients with type 2 diabetes may be as important as, treating hypertension and dyslipidemia for the prevention of both microvascular and macrovascular complications, particularly when aggressive treatment is initiated at an early stage of the disease².

A review of various published reports was published by Del prato, it concluded that hemoglobin A1c is the standard for monitoring glycemic control. The results in the U K prospective diabetes study indicated that each 1% decrease in HbA1c reduces the risk of mortality associated with diabetes by 21% and the risk of myocardial infarction by 14%³.

The care provided in (NBB at Dair) health center for diabetic patients was provided in the daily general clinic by family physicians and general practitioners. There was no assigned diabetic nurse for the health center till March 2006 which is after the conduction of the study.

The aim of the study is to determine the frequency of use of HbA1c level as an indicator for type 2 diabetes control and to identify the glycemic control among type 2 diabetic patients.

METHOD

A register including all type 2 diabetes mellitus patients, at Dair was developed using the information provided by physicians and prescriptions from the pharmacy. A list of 383 patients was identified. All diabetic patients' medical records were reviewed by three physicians during April and May 2005.

Data such as name, CPR, gender, type of treatment of diabetes mellitus, and the average level of HbA1c level during the year 2004 was gathered from the medical records.

The average readings of HbA1c was calculated when it was done more than once.

The data was entered in a statistical program Statistical Product and Service Solutions (SPSS) version 13 and analyzed accordingly.

Frequency tables were done for age, gender, type of treatment and hemoglobin A1C level. Means and standard deviations were compared for HbA1c levels, Anova and Independent T- Test were used to compare between the levels of HbA1c and the type of treatment and gender.

RESULT

The total number of type 2 diabetics studied was 383. One hundred and sixty-two (42.3 %) were males and two hundred twenty one (57.7 %) were females. Their age ranges between 30 and 88 years with mean and standard deviation of 55.14 ± 12.08 . Only 8.6% of type 2 diabetic cases were between 30 and 39 years, 55.6 were between 40 and 49 years old, while 35.8% were 60 years and above. (Table 1)

Table 1: The distribution of age groups and percentage of each age group.

%	N	Age Group in years
8.6	33	30-39
26.1	100	40-49
29.5	13	50-59
35.8	137	60 and over
100	383	Total

Three hundred twenty-seven cases (85.4%) of type 2 diabetic cases were on oral treatment, 24 cases (6.3%) were on both oral and insulin treatment, 23 cases were on insulin therapy and 6 cases (2.3%) were on diet alone. (Figure 1)

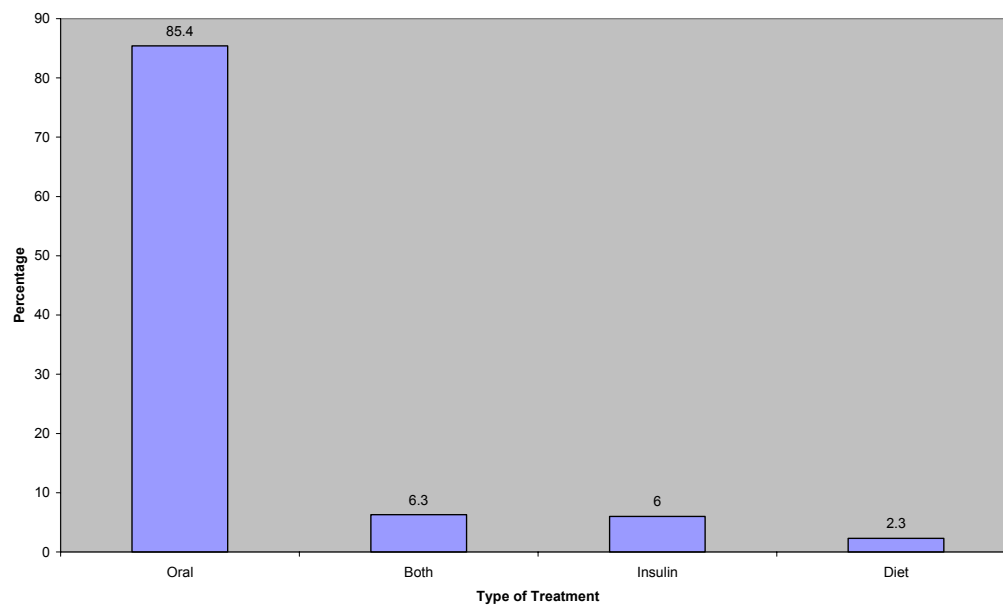


Figure 1: The type of treatment received by patients (%).

The level of HBA1c ranges between 5.1% and 17.1%, the mean HBA1c level was 9.68 ± 2.30 .

One hundred seventy-eight cases (46.5%) of type 2 diabetic cases had HBA1c done for them. Among those who had HBA1c tested, Only twenty cases (11.2%) were controlled with an average HBA1c test result of 7% or less while the majority 158 cases, (88.8%) were uncontrolled. (Table 2)

Table 2: The distribution of hemoglobin A1c level among cases who had HBA1c tested.

%	N	HBA1c level
3.9	7	5.01- 6.00
7.3	13	6.01-7.00
16.3	29	7.01-8.00
15.2	27	8.01-9.00
16.3	29	9.01-10.00
16.9	30	10.01-11.00
10.1	18	11.01-12.00
5.6	10	12.01-13.00
8.4	15	>13
100	178	Total

There was no significant correlation between HBA1c and age of the patients. (r= -0.012, p = 0.87).

There was no statistically significant difference between the mean of HBA1c for males (9.7±2.2) and females (9.6±2.3) (p=0.81). There was no statistically significant difference between the mean of HBA1c and the type of treatment: (9.6±2.2 for oral), (9.8±2.8for insulin) and (10.5±2.0for both) (p=0.37). (Table 3)

Table 3: The distribution of HBA1c according to the type of treatment and gender.

Type of treatment	Male		Female		Total		P value**
	N	Mean ± SD	N	Mean ±SD	N	Mean ± SD	
Oral	47	9.6±2.3	106	9.6±2.2	153	9.6±2.2	0.97
Insulin	3	10.2±2.4	7	9.7±3.1	10	9.8±2.8	0.79
both	6	10.4±1.7	7	10.6±2.4	13	10.5±2.0	0.90
Total	56	9.7±2.2	120	9.6±2.3	176	9.6±2.3	0.81
P value*	0.64		0.56		0.37		

*P value calculated based on F Test (ANOVA).

** P value calculated based on Independent T Test

Note: The total number here who had the test done was 176, after omitting diabetics on diet who had the test since their number was small for ANOVA test.

DISCUSSION

The percentage of controlled HBA1c in this study was 11.2% compared to 44% found by Shorr RI et al among type 2 diabetic persons on oral hypoglycemic drugs⁴. Other

studies showed a percentage of controlled diabetes mellitus among 40.5% and 53% of cases^{5,6}.

The mean level of HBA1c among diabetic patients who had the results available was $9.6\% \pm 2.2$. A similar level of mean HBA1c (9.2 ± 1.33) was found among type 2 diabetic persons at the baseline of a comparative study conducted in USA⁷. Lower levels of mean glycosylated hemoglobin was found among type 2 diabetic patients in a study in USA ; mean HBA1c was 7.7% for persons aged 20 to 54 years, 7.64% for persons aged 55 to 64 years old⁴. A mean glycosylated hemoglobin level of 7.5 ± 1.73 was found in a study conducted in USA at a primary care setting among type 2 diabetes mellitus persons⁵.

There was no statistically significant relation between the HBA1c level and neither gender nor the type of treatment. This finding over emphasizes that other factors should be studied and tackled accordingly.

Only 46.55 of type 2 diabetes mellites persons in this study had HBA1c level tested , 88.8% diabetic patients, who had HBA1c done were uncontrolled. It might be due to patient's and or physician's factors;

Patient's factors include:

- Compliance to follow up.
- Compliance to treatment.

Physician's factors include:

- Improper follow up by physicians.
- Dependence of physicians on fasting blood sugar only as an indicator of control.
- Insufficient time of consultation and counseling.
- Unavailability of diabetic clinic.
- Rapid physicians turnover.

These factors need to be investigated in further studies in order to improve the quality of care of type 2 diabetes in the primary health care setting.

CONCLUSION

HBA1c was underused as an indicator for diabetic control in Dair health center. Furthermore, more stress on strict glycemic control needs to be emphasized.

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