Diabetic Profile- Screening of HBA1C - A Random Community Assessment

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ABSTRACT

Background: Diabetes mellitus is becoming the commonest non–communicable disease in the world. Strict control of diabetes mellitus is associated with fewer incidences of complications. Screening for control of diabetes is a useful intervention, because diabetes is a highly morbid illness with a long asymptomatic phase. Glycosylated Haemoglob in (HbA1C) is the ideal parameter which can be used to assess the diabetic control, as this parameter is not alterable with single day manipulations.

Aims: Our main objective was to find out the mean HbA1C in a random assessment. The other supplementary objectives were to find out the prevalence of hypertension, smoking, obesity, vascular events and hypoglycaemic episodes and any possible correlation with HbA1C values.

Methodology: The selection of 100 diabetic patients who reported to the diabetic centre in a randomly selected day was done. They were subjected to a simple questionnaire with on spot HbA1c assessment. The questionnaire described the evidence of vascular events, risk factors, hypoglycaemic episodes, etc.

Results: A mean HbA1C value of 8.91 was found out, which was far higher than the normal (7.0%). The prevalences of other variables coincided with those which were seen in previous studies. The hypoglycaemic episodes were high, but the patients with such episodes had a higher mean HbA1C. This could be possible as our patients consumed sweet and sugar with such events and had higher mean glucose values. It has been suggested that physicians and patients should work synchronously to achieve better diabetic control. The physician should strictly enforce   weight reduction and quitting of smoking.

INTRODUCTION

Diabetes Mellitus (DM), often referred to as diabetes — is a condition in which the body either does not produce enough insulin, or does not properly respond to insulin. This leads on to hyperglycaemia, which is the basic cause of systemic complications associated with the disease. Strict control of blood sugar remains the pivot in the decreased incidence of complications [1]. Glycated haemoglobin or A1C should be measured in all individuals with DM during their initial evaluation and as part of their comprehensive diabetes care [2]. It is the primary predictor of long-term complications of DM [3]. In the normal 120 day life span of the RBCs, glucose molecules react with Hb, forming glycated Hb. Measuring HbA1c can reveal as to how high the blood glucose has been on an average, over the past 8-12 weeks. A normal non-diabetic HbA1c value is 3.5-5.5%. In diabetics, range of 6.5% to 7% is good. In individuals with poorly controlled diabetes, the quantity of this glycated Hb is much higher than in healthy people. A build up of glycated Hb within the red blood cells, therefore, reflects the average level of glucose to which the cells have been exposed during their life cycle. The glycaemic goal is to achieve an A1C as close to normal as possible, without developing significant hypoglycaemia. In general, the target A1C should be <7.0% with a more stringent target (<6%) for many patients. A higher A1C goal may be appropriate for the very young or old or in individuals with limited life spans or comorbid conditions [4]. The major consideration is the frequency and severity of hypoglycaemia, since this becomes more common with a more stringent A1C goal. The advantages of doing HbA1C assessment are non–requirement of fasting, with fewer perturbations with stress, diet and exercise. It captures the chronic hyperglycaemia better than fasting glucose levels. The analytical variability is similar with estimation of blood glucose levels [5]. With this background, we made a random assessment of HbA1C in a sample diabetic population, using clinical questionnaire on complications. Such simple data collections with their analysis for the South Indian population are not available much.

Aim

1. To find out the control of diabetes in randomly selected patients of a community in a given time.

2. To find out the clinical incidence of target organ damage in terms of a vascular event.

3. To find out the incidences of hypoglycaemic episodes and their correlations with HbA1C levels.

4. To estimate the prevalence of risk factors like smoking and obesity.

MATERIAL AND METHODS

A simple observational study was conducted on diabetic patients at the diabetic centre in Kumbakonam, Southern India. The first 100 semi–urban diabetic patients who came to two nearby private clinics with similar treatment concepts in one day were taken up for the study. They were subjected to a simple questionnaire and a random HbA1c level was estimated after getting their consents. No ethical issues were involved, as the study was basically about filling questionnaire. The sample size was 100. The sample size had an alpha power of 80%, considering power analyses from the internet searched software, suited for such studies.   We could trace no previous such studies which were done. All the patients selected were known diabetics who were on treatment. The patients were presented with a questionnaire on their treatment schedule. This was like the one given below.

HbA1c was measured for all patients randomly (Beyer A1c now kit). Patients who had a blood pressure of more than 140/90 mm Hg were designated as hypertensives. Patients with a known history of hypertension, on drugs for the same were also considered as hypertensives. Patients on anti–lipid therapy e.g., Atorvastatin were noted and entered in the chart. If a vascular event had occurred, it meant the patient either had a myocardial infarct (heart attack) or a cerebrovascular accident (stroke) before the study was done. If a hypoglycaemic event had occurred in the prior month, it meant that the patients were denoted as "yes" in the proforma. The Whipple's triad was taken into consideration, which describes a hypoglycaemic episode as follows. The triad is stated in various versions, but the essential conditions are:

1. Symptoms known or likely to be caused by hypoglycaemia.
2. A low plasma glucose measured at the time of the symptoms.
3. Relief of symptoms when the glucose is raised to normal.

The patients with BMIs of more than 25 were considered as overweight and they were listed in the risk factor category as 'yes', if they have the habit of cigarette smoking, notwithstanding the number of cigarettes that they smoked per day. All the data from proforma fed into computer for SPSS, descriptive statistics and t–test with correlation analysis when deemed necessary and if p value was < 0.05, it was considered as statistically significant.

RESULTS

The mean age of patients was 45.6 ± 6.7 years. The male: female ratio was 69:31. The mean HbA1C was 8.91 ± 2.91, with a maximum of 14.3. The results have been tabulated below, which showed that only 23 % patients had HbA1c of less than 7.5 % see [Table/Fig-1]. The prevalence of hypertensives in diabetics is as follows: Among the selected 100 patients, 38 were hypertensives and sixty two were not. Forty eight out of the hundred had hypoglycaemic symptoms in the recent past. On regarding the presence of a vascular event which was an attack of cerebro vascular event or a myocardial infarct earlier, 17 out of 100 were found to have such morbidities. Twenty nine out of 100 patients were taking anti dyslipidaemic drugs. Sixty nine patients had accompanying risk factors like smoking and obesity. The variations in HbA1C between the differing groups i.e whether or not there was associated hypertension, presence of vascular events, was insignificant. But in patients with hypoglycaemic episodes, the mean HbA1C was higher see [TableFig-2] (p<0.05).

HbA1c value	Number of patients
<7.5 (fair control)	23
7.5 –10 (poor control)	40
>10 (very poor control)	37

[Table/Fig-1]: Showing HbA1c

	HT yes – HT no	Vasc. Yes— Vasc. no	Hypo yes – Hypo no
Mean HbA1c	8.99 –8.88	8.92–8.92	8.75–9.22
t –test	p> 0.05	p> 0.05	p<0.05

[Table/Fig-2]: Showing the mean HbA1c values with or without events with statistical significance
HT = hypertension, Vasc. = vascular event, hypo = hypoglycaemic episodes

DISCUSSION

The mean age of our patients was 45.6 years, with a 2:1 male preponderance, which was consistent with findings of earlier studies [6,7]. The global mean age was 52.9 years, which was ten years higher than the mean Indian diabetic mean age. The mean HbA1c was very high in our patients, which clearly demonstrated the poor control of diabetes mellitus in our patients. In a Canadian study [8] done by pharmacists, the mean HbA1c was found to be 7.25%, and 43.6% of patients had HbA1c values of over 7%,

while 10.3% of patients had HbA1c values of over 9.5%. Maizlish NA et al., [9] clearly demonstrated that 27 % had poor control of diabetes mellitus in a community, which was bettered with visits of health workers and diabetes education. In another study, Gavran L et al., [10] proved that family medicine teams could improve diabetes control in a community. In our study, 77 % of randomly selected cases were poorly controlled, which was actually alarming. Number of such studies done in India are very less. We want to emphasize that community level correction of factors which cause such poor control should be analyzed and corrected. We also suggest that the part played by the treating physician should go beneath the laboratory values and the patient, for finding out the causes of such poor control. The mean HbA1c values were similar in patients with either a vascular event or without it, but this was insignificant in the sense that only 17 patients had such events. The prevalences of other variables coincided with those seen in previous studies [11]. The hypoglycaemic episodes were high, but the patients with such episodes had higher mean HbA1C values. This could be possible as our patients consumed sweet and sugar with such events and had a higher mean glucose values [12]. This is our possible hypothesis, as it is a significant new finding. The co morbid risks like smoking and obesity [13,14] are present in very large numbers of patients (69%). With such a high co morbid illness, only 29 % were taking anti–dyslipidaemic drugs [15]. This goes on to say that either patient awareness or prescription awareness should improve, for preventing end organ damage in poorly controlled cases. Since, the prevalence of diabetes mellitus in urban India has increased from 8.2–18.6% , that in rural India has increased from 2.4–9.2% in the past two decades, such a study assumes significance [16]. We admit that we did not have a clue on their previous glycaemic control and hence the vascular events per se, which made them improve their treatment options, remain unclear. Its true that we did the study based on HbA1C values. Still the HbA1C test is studded with abundant limitations. The HbA1c level may vary with haemoglobinopathies, anaemia, HIV infection, renal failure and with certain ethnic differences [17,18]. As this test is a significant marker of chronic hyperglycaemia, studies have shown that the prevalence of significant diabetic retinopathy in people even without a known diagnosis of diabetes, increases with an HbA1c of approximately 6.5–6.9%.The incidences of cardiovascular and renal changes increase with HbA1C values of 6.7 or more. Hence, as HbA1C represents chronic hyperglycaemia, it can predict the prevalence of comorbidities [19]. In our study, we found increased HbA1C levels in the community without significant differences, irrespective of whether a vascular event had occurred or not. With very minimal previous work being done on such community assessments in Indian patients, the limitations of our study are clear. We admit that this was a simple observational and questionnaire based study done on a single day and such studies are lacking in India, which has its own drawbacks. We accept that ours was a small sample size and that further community based larger studies are a must, for improving current disturbing trend in diabetic control.

CONCLUSION

To conclude, the mean HbA1c was 8.91 in a random community assessment, for proving that the control of diabetes was poor. The prevalence of hypertension and vascular events were along expected lines. The patients with hypoglycaemic events had significantly higher HbA1c values. The prevalences of risk factors were high. The percentage of patients taking anti–dyslipidaemic drugs was lower. We suggest, that community level awareness should be created for a better control of diabetes mellitus and its ensuing complications.

ACKNOWLEDGEMENT

statistical assistance and necessary conceptual ideas during the study.

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