Short Communication

CONCOMITANT USE OF INSULIN GLARGINE AND NPH IN TYPE-1 DIABETES.

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ABSTRACT

In this prospective study on 13 patients with type 1 diabetes we evaluated the glycemic control and hypoglycemic episodes on a combination therapy of NPH and glargine insulin. Glycosylated hemoglobin (HbA1C), fasting (FPG), Post Prandial glucose (PPG), and blood glucose on arrival from the school levels were recorded at baseline and two monthly intervals for 6 months. The mean HbA1C reduced from 9.7 to 7.1%, incidence of hypoglycemia reduced from 1.8 to 1.2, mean Fasting Blood Glucose (FBG) from 121to 108 mg/dl and mean blood glucose on arrival from the school from 287.6 to 167.3 mg/dl over 6 months observation period. This regimen helps us to ovoid hyperglycemia on arrival from the school with no increase in hypoglycemic events.

KEY WORDS: Glycosylated hemoglobin, Type 1 diabetes, Insulin glargine.

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INTRODUCTION

Insulin Glargine is a long acting analogue of insulin, which has a peakless profile and has been used successfully in the management of type 1 diabetes in combination with short or ultra short acting insulin preparations.[1] It has been shown to reduce the incidence of nocturnal hypoglycemia and is at least as effective as NPH in controlling Glycosylated hemoglobin (HbA1C).[2,3] In most clinical trials insulin glargine is used as basal insulin along with 3 or 4 doses of short or ultra short acting insulin. The disadvantage of this regimen is that a minimum of 4-5 injections per day have to be administered, very frequent blood sugar monitoring becomes mandatory and the cost of monitoring and therapy together is quite high. The short acting insulin should be given within 6-8 hours with the meals. The school time is almost 6 hours and most of our diabetic students take another meal without insulin. So blood glucose levels will be high on the arrival from the school. NPH insulin has a peak action after two hours of injection on the time of the student's meal. We studied the effect of adding NPH insulin in the morning on the blood glucose levels on arrival from the school.

PATIENTS AND METHODS

Thirteen patients with type 1 diabetes between the age of 11 and 16 years were studied. At the beginning of the study all patients were on glargine insulin plus premeals short acting insulin (as part). They continued on the same regimen except the short acting insulin before breakfast changed to NPH insulin. Glargine insulin was given as a separate injection and at a separate site. Patients were asked to perform home monitoring of blood glucose (HMBG), and keep a diary and were requested to report to the clinic every month. The HMBG

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should be done 6 times per day at least 3 days a week whereas on other days it should be performed twice per day and on arrival from the school every day. Performance checks were made on patient's glucometers at each of these monthly visits. Parameters studied included height, weight, HMBG reading, Glycosylated hemoglobin (HbA1C) and number of hypoglycemic episodes at baseline, 3 months and 6 months period. HbA1C was performed by High Performance Liquid Chromatography (HPLC). All data were registered in the data sheets prepared for this study. The purpose of the study and expected side effect like hypoglycemia in the school were explained to the patients and their parents. The consent forms were signed from all patients' parents.

The patients were selected if on arrival from school, their blood glucose was found to be higher. All the blood glucose level even in case of hypoglycemia were reviewed in the clinic. Howevere in case of severe hypoglycemia and blood glucose of <50, the patients were advised to contact directly and come to the hospital immediately.

The data sheets were studied and statistical analysis were performed by SPSS 10.

RESULTS

Of the 13 patients studied, 7 were female and 6 were males. Mean age of the patients at the time of starting the study was 14.7 years and mean duration of diabetes was 3.9 years (6 months to 8 years). The mean daily dose of the insulin was 0.9unit/kg at baseline; it was 1u/kg at 3 months and remained the same at the end of 6 months of therapy.

As shown in Table-I the HbA1C, fasting blood glucose (FBG), post Prandial, and blood glucose at the arrival from the school levels reduced after 6 months of therapy.

The declines in fasting and post prandial blood glucose were not significant because the patients were on intensified insulin therapy from the beginning, but blood glucose on arrival from the school and glycosylated hemoglobin were reduced significantly with P- value 0.001 and 0.002 respectively.

Table-I: Mean values of the study parameter.

	Baseline	*3 months*	*6 months*
Glycosylated Hemoglobin (%)	9.7%	8.4%	7.1%
Hypoglycemic Episodes.	1.8	.8	1.2
Glargine (u/kg/d)	0.4	0.4	0.4
Short acting Insulin dose u/kg	0.5	0.4	0.4
NPH insulin dose u/kg/d.	—	0.1	0.16
Fasting blood glucose mg/dl.	121	111	108
Post prandial glucose mg/dl.	165	166	154
Blood glucose at arrival from the school. Mg/d/	287.6	188	167.3

DISCUSSION

The Diabetes Control and Complication Trial (DCCT) and other similar studies have demonstrated that improved glycemic control with intensive insulin therapy in patients with type 1 diabetes mellitus led to greater reductions in retinopathy, nephropathy, and neuropathy.[2] What was considered intensive insulin therapy in DCCT is now considered to be the standard therapy. The term intensive insulin therapy has been used to describe more complex regimen that separate basal insulin therapy (given as one to two daily injections of intermediate – or long acting insulin) with superimposed doses of rapid or very – rapid acting insulins three or more times daily. In the past, the most commonly used multiple – dose regimen consisted of twice – daily injections of rapid acting and intermediate acting insulin. This regimen was not physiologic and is no longer recommended. Insulin glargine has no peak which makes it a good basal insulin preparation for intensive insulin therapy in type 1 diabetes.[3,4] Insulin glargine has been shown to be better than twice daily Ultralente or NPH in controlling HbA1C, and in some studies it has been shown to control fasting blood glucose better than NPH. It comes closest to CS11, which is the gold standard in insulin therapy today[5] and use of

Glargine insulin has been shown to reduce the incidence of hypoglycemia in general and nocturnal hypoglycemia in particular.[6]

The major decision in initiating intensive insulin therapy is whether the patients and physician are more comfortable with multiple daily injection or continuous subcutaneous insulin infusions. There are no differences between the regimens in efficacy, frequency of hypoglycemic events, or more impact on quality of life for most patients.[7]

In Saudi Arabia most of our patients with Type-1 diabetes is treated by multiple insulin injections. Some patients resist such type of treatments because of multiple injections and the needs for frequent home glucose monitoring. The other problem we faced during treatments with multiple insulin injections was prolonged school time and all patients refused taking the injection in the school. So blood glucose will be very high on arrival from the school in most of them. So to overcome this problem we decided to use NPH insulin in the morning before breakfast.

We used a regimen, which consisted of NPH insulin before breakfast, short acting insulin before lunch and dinner and once daily glargine insulin giving either in evening or afternoon. The peak action of the NPH will be during the school time and no fears of hypoglycemia as they usually eat in the school. Most of the children did not eat good breakfast at home before they go to the school so no worry of hyperglycemia. NPH during daytime along with glargine increased the level of circulating insulin during waking hours but as most children eat 4-5 times during the day, increased incidence of hypoglycemia during the day was not noted. The blood glucose on arrival from the school improved significantly in our patients who received the NPH insulin in the morning instead of short acting insulin.

CONCLUSIONS

We conclude from this study that NPH insulin can be added to intensive insulin regimen including glargine insulin, instead of short acting insulin in the morning. This regimen showed better blood glucose level on arrival from the school, as well as decreased HbA1C significantly.

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