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Original Article

Basal Insulin Initiation in Elderly Patients with Type 2 Diabetes in Taiwan: A Comparison with Younger Patients☆

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SUMMARY

Background: Basal insulin is a common therapy for insulin initiation in patients with type 2 diabetes mellitus (T2DM) uncontrolled with oral antidiabetic drugs (OAD). There is limited data for initiating basal insulin therapy in the elderly population in clinical practice.

Methods: The aim of this study was to analyze 72 Taiwanese patients with T2DM on OAD with glycated hemoglobin (HbA1c) > 7% who received basal insulin therapy with insulin glargine for 24 weeks in clinical practice. The patients were divided into an older group (≥ 65 years, $n = 32$) and younger group (< 65 years, $n = 40$) for comparison purposes.

Results: At baseline, the duration of diabetes was longer and the fasting plasma glucose (FPG) level was slightly lower in the older group versus the younger group. The number of OAD types was significantly reduced after initiation of basal insulin in both groups. After the 24-week treatment of insulin glargine, the HbA1c and the FPG were significantly reduced by 1.18% and 81.3 mg/dL, respectively, in the older group, and by 1.49% and 93.0 mg/dL, respectively, in the younger group, but did not differ statistically between the two groups. The mean daily insulin doses in both groups were similar. Body weight increased significantly but it was comparable in older and younger patients. The rate of hypoglycemic events was low and no difference was found between the two groups.

Conclusion: In elderly people with T2DM in Taiwan who had inadequate glycemic control by OAD, initiation of basal insulin therapy with insulin glargine over 24 weeks provided effective glycemic control similar to the younger population.

1. Introduction

The prevalence of diabetes is increasing in Taiwan.[1,2] Diabetes is highly prevalent in elderly people. The rate of prevalence is ~20% of the population aged ≥ 65 years in Taiwan,[1,2] which presents a great burden to individuals, society, and health care services.

The management of elderly patients with type 2 diabetes mellitus (T2DM) has become more complicated because of age-related physiological changes and the impact of comorbidities, complications and hypoglycemia.[3–5] Recently, long-acting insulin analogues were designed to mimic physiological basal insulin secretion.[6,7] Insulin glargine has been well proven, in addition to oral agents, to control fasting blood glucose with a low risk of hypoglycemia.[8–10] In clinical practice, basal insulin is a common choice for insulin initiation in patients with T2DM uncontrolled with oral antidiabetic drugs (OAD).[11–13] However, there was limited data to compare effectiveness and tolerability of basal insulin therapy in elderly population versus the younger population in clinical practice.

The present study was performed to compare the effectiveness and tolerability of basal insulin therapy with insulin glargine between older (≥ 65 years) and younger (< 65 years) T2DM patients with inadequate control by OAD.

☆ Conflicts of interest: All contributing authors declare that they have no conflicts of interest.

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2. Materials and Methods

2.1. Study design and patients

This data analysis was performed using an insulin registry from 2010 to 2012 in Mackay Memorial Hospital, Taipei, Taiwan. Institutional Review Board approval was obtained for this registry and written informed consent was obtained from each patient in the registry. Patients were identified and included for this analysis if they met the following criteria: patients should be ≥ 20 years old, have a diagnosis of T2DM on OAD for ≥ 24 weeks with glycated hemoglobin (HbA1c) > 7%, initiate once daily basal insulin therapy with insulin glargine in an outpatient setting, and continue the treatment for 24 weeks. Patients should also have HbA1c tests at baseline (before initiation of insulin) and at 24 weeks. For comparison purposes, the patients were divided into an older group (≥ 65 years) and a younger group (< 65 years). We also compared patients with and without hypoglycemic episodes to analyze which factors were associated with occurrence of hypoglycemia.

2.2. Evaluation

The effectiveness of the treatment was measured by the change in HbA1c between the two groups after 24 weeks of treatment. We also measured fasting plasma glucose (FPG), body weight, and recorded the hypoglycemic episodes and other adverse events (AE) during the basal insulin treatment period.

2.3. Statistical analysis

For quantitative data, the Student *t* test was used for before- and after-treatment comparisons and for intergroup comparisons. Qualitative variables were compared using Fisher's exact tests or Chi-square tests. A p value < 0.05 was considered to be significant.

3. Results

Thirty two patients with T2DM in the older group and 40 patients in the younger group were included for analysis. The baseline characteristics in both groups are shown in Table 1. The mean age (standard deviation, SD) was 72.5 (5.3) years in the older group and 52.6 (8.1) years in the younger group (p < 0.0001 for intergroup comparison); the mean diabetes duration was 14.1 (6.8) years in the older group and 10.5 (4.9) years in the younger group (p = 0.0119 for intergroup comparison). All patients were receiving OAD including metformin, sulfonylureas, dipeptidyl peptidase 4 (DPP-4) inhibitors, thiazolidinediones (TZD), alpha-glucosidase inhibitors (AGI), and glinides before and at initiation of basal insulin therapy (Table 1). More patients in the younger group were treated with metformin and TZD than those in the older group before or after initiation of basal insulin therapy. The number of OAD types was significantly reduced on initiation of basal insulin in both the older group (p < 0.0001) and the younger group (p < 0.0001).

At baseline, the mean HbA1c were not different between these two groups (Figure 1). However, the FPG at baseline was slightly higher in the younger group than that in the older group (p = 0.0302 for intergroup comparison; Figure 1). Initiating basal insulin treatment with insulin glargine significantly reduced HbA1c and FPG in both groups at 24 weeks compared with baseline values (Figure 1). HbA1c and FPG were reduced by 1.18 ± 1.76% (p = 0.0006) and 81.3 ± 79.9 mg/dL (p < 0.0001), respectively, in the older group. In the younger group, HbA1c and FPG were reduced by 1.49 ± 2.12% (p < 0.0001) and 93.0 ± 82.5 mg/dL (p < 0.0001), respectively. However, there was no statistically significant difference between the two groups for the reductions in HbA1c

Table 1
Baseline characteristics of the patients.

Characteristics	≥65 y n = 32	<65 y n = 40
Age (y)*	72.5 ± 5.3	52.6 ± 8.1
Male	59.4 (19)	57.5 (23)
Female	40.6 (13)	42.5 (17)
Weight (kg)	64.1 ± 8.8	67.5 ± 16.3
BMI (kg/m^2)	25.2 ± 3.6	25.3 ± 5.4
Diabetes duration (y)**	14.1 ± 6.8	10.5 ± 4.9
Patients with diabetic nephropathy	25.0 (8)	15.0 (6)
OAD before basal insulin		
Metformin	56.3 (18)	75.0 (30)
Sulfonylureas	87.5 (28)	80.0 (32)
DPP-4 inhibitors	56.3 (18)	47.5 (19)
TZD	16.5 (5)	57.5 (23)
AGI	40.6 (13)	30.0 (12)
Glinides	9.4 (3)	15.0 (6)
OAD with basal insulin		
Metformin	37.5 (12)	57.5 (23)
Sulfonylureas	75.0 (24)	52.5 (21)
DPP-4 inhibitors	28.1 (9)	17.5 (7)
TZD	0 (0)	20.0 (8)
AGI	25.0 (8)	12.5 (5)
Glinides	6.3 (2)	15.0 (6)
Number of OAD types before basal insulin,	2.66 ± 0.83	3.05 ± 0.90
Number of OAD types with basal insulin	1.72 ± 0.77#	1.75 ± 1.01***

Data are presented as % (n) or mean ± SD.
* p < 0.0001 for intergroup comparison.
** p = 0.0119 for intergroup comparison.
*** p < 0.0001 for before and after basal insulin comparison.
AGI = alpha glucosidase inhibitors; BMI = body mass index; DPP-4 inhibitors = dipeptidyl peptidase-4 inhibitors; OAD = oral antidiabetic drugs; SD = standard deviation; TZD = thiazolidinediones.

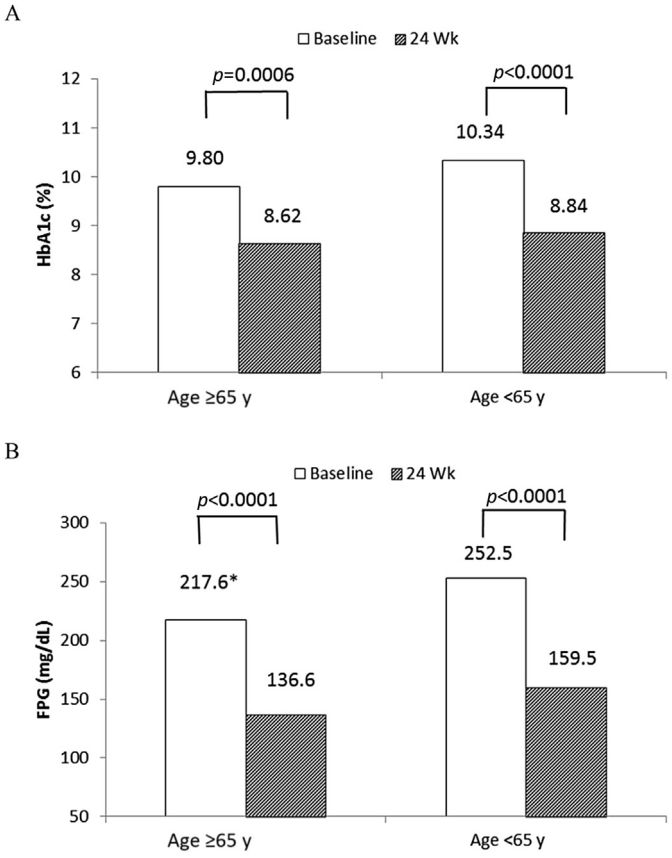

Figure 1. (A) Mean HbA1c and (B) mean FPG at baseline (before basal insulin initiation) and after 24 weeks of treatment in the older group (≥ 65 years) and the younger group (< 65 years). * p = 0.0302 for intergroup comparison at baseline. FPG = fasting plasma glucose; HbA1c = glycated hemoglobin.