

Impact of fasting and postprandial glycemia on overall glycemic control

Importance of postprandial glycemia to achieve target HbA1c levels

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Introduction

HbA1c levels reflect overall glycemic exposure over the past 2-3 months and are determined by both fasting and postprandial plasma glucose concentrations.

Cross sectional studies suggest that attainment of HbA1c goals require specific targeting of postprandial hyperglycemia.

We therefore undertook a prospective intervention trial to assess the relative contribution of controlling fasting and postprandial hyperglycemia in T2DM in achieving recommended HbA1c goals.

Methods

| | |
|---------------------------|-------------------|
| N | 164 |
| Age (years) | 62.4 ± 0.9 d |
| Gender | 90 men / 74 women |
| BMI | 28.8 ± 0.6 |
| diabetes duration (years) | 8.4 ± 0.6 |

Before intervention and after three months patients were asked to measure a seven-point diurnal blood glucose profile and HbA1c levels were obtained. Subjects participated in a one week intensified training program for life style intervention.

- reduction in calorie intake
- avoidance of rapidly absorbed carbohydrates
- avoidance of high fat and high protein consumption
- importance of physical activity
- to eat 3 meals/day

Goal of therapy: FPG < 110 and PP PG < 150 mg/dl

Therapeutic Approach:

- FPG > 110 but < 154 mg/dl => metformin
- On metformin and FPG > 110 mg/dl => sulfonylurea
- On metformin plus sulfonylurea and goals were not achieved => NPH insulin at bedtime (titrated to target), sulfonylurea were discontinued
- FPG initially > 154 mg/dl => NPH + metformin, other OAD's were discontinued
- Once at FPG goal, PP PG > 154 mg/dl => repaglinide (prior to the meal)
- If goals were not achieved repaglinide was stopped => short-acting insulin

All patients were seen at least once a week initially and at three months thereafter.

Results

Effects of intensified treatment regimens (N=164)

| | Pre | Post | P |
|--------------------------|------------|------------|---------|
| HbA1c (%) | 8.7 ± 1 | 6.5 ± 1 | < 0.001 |
| FPG (mg/dl) | 174 ± 4 | 117 ± 2 | < 0.001 |
| Post breakfast (mg/dl) | 233 ± 6 | 159 ± 3 | < 0.001 |
| Pre lunch (mg/dl) | 170 ± 6 | 116 ± 2 | < 0.001 |
| Post lunch (mg/dl) | 213 ± 5 | 155 ± 4 | < 0.001 |
| Pre dinner (mg/dl) | 176 ± 5 | 133 ± 4 | < 0.001 |
| Post dinner (mg/dl) | 227 ± 6 | 164 ± 4 | < 0.001 |
| Bedtime (mg/dl) | 201 ± 5 | 143 ± 3 | < 0.001 |
| Average postmeal (mg/dl) | 224 ± 4 | 159 ± 3 | < 0.001 |
| Daylong (mg/dl) | 199 ± 4 | 141 ± 2 | < 0.001 |
| Weight (kg) | 84.0 ± 1.4 | 82.9 ± 1.5 | < 0.36 |

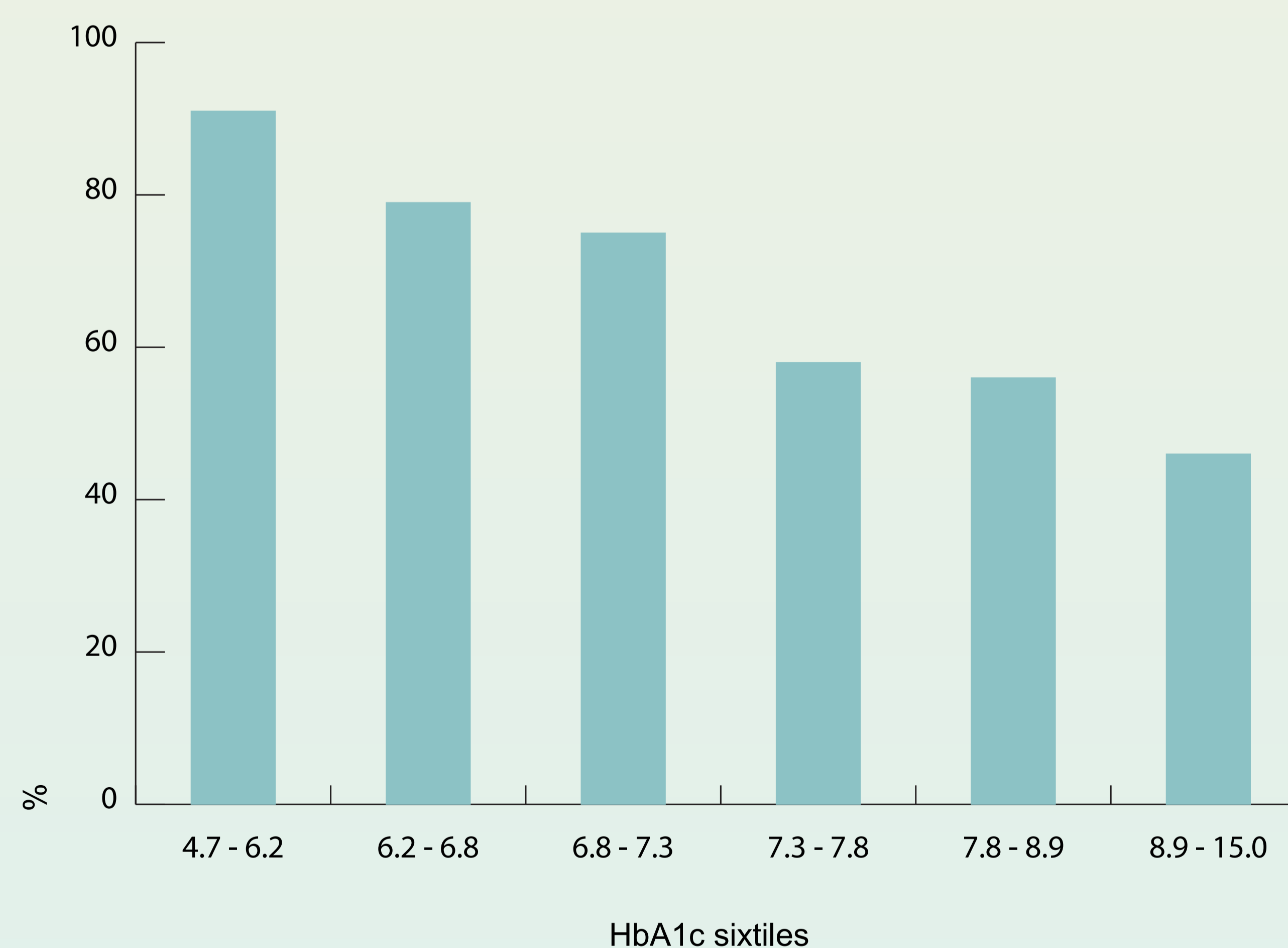
Glucose profiles after 3 months in subjects who achieved HbA1c targets of ≤7% and >7%



Cases of hypoglycemic episodes before and after intensification of treatment

| Plasma glucose (mg /dl) | Cases before | Cases after |
|-------------------------|--------------|-------------|
| 70 - 61 | 4 | 10 |
| 60 - 51 | 1 | 1 |
| 50 - 41 | 0 | 1 |

Relative contribution of postprandial glycemia over HbA1c sextiles



Conclusions

- good glycemic control can be achieved in middle aged otherwise healthy patients with type 2 diabetes without concomitant weight gain or severe hypoglycemia
- both fasting and postprandial hyperglycemia need to be targeted
- postprandial glycemia contributes more than fasting glycemia to HbA1c as HbA1c levels decrease
- control of postprandial glycemia is essential for obtaining HbA1c goals of <7%

Note

The current study has been specifically cited by the current International Diabetes Federation guidelines (IDF) on the importance of postprandial glucose control to achieve HbA1c goals.