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ORIGINAL ARTICLE

Relationship between metabolic control and self-monitoring of blood glucose in insulin-treated patients with diabetes mellitus☆

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KEYWORDS
Diabetes mellitus;
Insulin;
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Metabolic control;
Type 1;
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Abstract
Objective: To assess the relationship between metabolic control (MC) and frequency of self-monitoring of blood glucose (SMBG) in insulin-treated patients with type 1 (T1DM) and type 2 (T2DM) diabetes mellitus, and to analyze the factors associated to MC.
Materials and methods: A multicenter, cross-sectional, observational study was conducted in which endocrinologists enrolled diabetic patients treated with insulin who used a glucometer. The cut-off value for MC was $HbA_{1c} \leq 7\%$. Grade of acceptance of the glucometer was assessed using a visual analogue scale (VAS).
Results: A total of 341 patients (53.5% males) with a mean age (SD) 52.8 (16.3) years, mean HbA_{1c} of 7.69% (1.25) and 128 (37.5%) with T1DM and 211 (61.9%) with T2DM were evaluable. SMBG was done by 86.1% at least once weekly. No relationship was seen between MC and SMBG ($p = 0.678$) in the overall sample or in the T1DM ($p = 0.940$) or T2DM ($p = 0.343$) subgroups. In the logistic regression model, hyperglycemic episodes (Exp-b [risk] 1.794, $p = 0.022$), falsely elevated HbA_{1c} values (Exp-b 3.182, $p = 0.005$), and VAS (Exp-b 1.269, $p = 0.008$) were associated to poor MC in the total sample. Hyperglycemic episodes (Exp-b 2.538, $p = 0.004$), falsely elevated

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HbA_{1c} values (Exp-b 3.125, $p = 0.012$), and VAS (Exp-b 1.316, $p = 0.026$) were associated to poor MC in the T2DM subgroup, while body mass index (Exp-b 1.143, $p = 0.046$) was associated to poor MC in the T1DM subgroup.
Conclusions: In this retrospective, non-controlled study on patients with DM treated with insulin who used a glucometer, no relationship was seen between the degree of metabolic control and frequency of use of the glucometer.

PALABRAS CLAVE
Diabetes mellitus;
Insulina;
Automonitorización glucemia capilar;
Control metabólico;
Tipo 1;
Tipo 2

Relación entre el control metabólico y la automonitorización de la glucemia capilar en pacientes con diabetes mellitus tratados con insulina

Resumen
Objetivo: Evaluar la relación entre el grado de control metabólico (CM) y la frecuencia de la automonitorización de la glucemia capilar (AGC) en pacientes con diabetes mellitus (DM) tipo 1 (DM1) y 2 (DM2) tratados con insulina, y analizar factores asociados al CM.
Material y métodos: Estudio observacional multicéntrico transversal en el que endocrinólogos incluyeron a pacientes con DM tratados con insulina que utilizaban un glucómetro. El punto de corte para definir un CM fue una $HbA_{1c} \leq 7\%$ y no control > 7%. Se valoró en una escala analógica visual (EAV) el grado de aceptación del glucómetro.
Resultados: Fueron evaluables 341 pacientes (53,5% varones), con una edad media ± DE de 52,8 ± 16,3 años, HbA_{1c} media de 7,69 ± 1,25%, 128 (37,5%) con DM1 y 211 (61,9%) con DM2. El 86,1% de los pacientes utilizaron el glucómetro al menos una vez en la semana. No se observó ninguna relación entre el CM y la AGC ni en la muestra total (p = 0,678), ni en DM1 (p = 0,940) ni DM2 (p = 0,343). En el modelo de regresión logística, se asociaron a un mal CM en la muestra total y en DM2 los episodios de hiperglucemias (Exp-b [riesgo] 1,794, p = 0,022, y Exp-b 2,538, p = 0,004, respectivamente), las concentraciones de HbA_{1c} falsamente elevadas (Exp-b 3,182 p = 0,005, y Exp-b 3,125, p = 0,012), y la EAV (Exp-b 1,269, p = 0,008, y Exp-b 1,316, p = 0,026), y en la DM1 el índice de masa corporal (Exp-b 1,143, p = 0,046).
Conclusiones: En este estudio observacional no controlado en pacientes con DM tratados con insulina que utilizan un glucómetro no se observa ninguna relación entre el grado de CM y la frecuencia de su uso en el último mes.

Introduction

In 2010, 2.5% of all deaths worldwide were due to diabetes mellitus (DM).[1] The prevalence of DM in Spain is 13.8%, and it should be noted that approximately half the patients do not know they are affected.[2] This is particularly important, because adequate blood glucose control has been shown to decrease microvascular complications.[3] It is well known that DM is a significant public health problem because of both its prevalence and associated comorbidities and the huge direct and indirect health costs derived from its care. All measures taken to achieve adequate blood glucose control will therefore help in reducing the costs incurred by patients with DM, which are higher than those incurred by non-diabetic patients in Spain.[4] One such measure, used in patients with both type 1 (T1DM) and type 2 DM (T2DM) on insulin therapy, is the self-monitoring of blood glucose (SMBG). SMBG is a widely recognized procedure for adequate blood glucose management in patients with DM on insulin therapy[5] because it allows both for the measuring of glucose under various circumstances, and for the detecting of hypoglycemia and glycemic excursions.[6]

However, little attention has been paid as to whether the impact of SMBG self-testing of insulin-treated patients with DM performed in daily clinical practice is dependent on good metabolic control, determined by plasma levels of glycosylated hemoglobin (HbA_{1c}), being achieved or not. The primary objective of this study was therefore to assess the relationship between metabolic control and SMBG frequency over the preceding month in insulin-treated patients with DM. Risk factors associated with poor metabolic control and patient acceptance of blood glucose measuring devices were also analyzed.

Patients and methods

A multicenter, observational, cross-sectional study including insulin-treated patients with T1DM and T2DM was conducted. The study was conducted by endocrinologists