The association between non-adherence and HbA1c among type 2 diabetes patients using basal insulin analogues

Abstract

Objective: The aim of the current study was to determine the association between medication non-adherence and HbA1c levels among type 2 diabetes patients currently using basal insulin analogues.

Methods: Data from the 2011 U.S. National Health and Wellness Survey (NHWS) were used. The NHWS is a patient-reported survey felled to a demographically representative sample of the adult US population (n=75,000). Analyses were restricted to those who reported a diagnosis of type 2 diabetes, were currently using insulin glargine or insulin detemir, had non-missing self-reported HbA1c values, and had non-missing medication adherence data (assessed using the Monk Mediation Adherence Scale (MMAS)). The association between medication non-adherence and HbA1c was examined using multiple regressions controlling for sociodemographics, health behaviors, and comorbidities.

Results: A total of 768 patients met the study inclusion criteria. These patients were mostly male (64.71%), had a mean age of 61.39 (SD=9.85), were predominantly obese (72.92%), and reported a mean HbA1c level of 7.33% (SD=1.41%). A third of patients (33.20%) reported engaging in at least one non-adherent behavior; the most common was forgetting to take their medication (38.53%) followed by being careless with medication (30.71%). Adjusting for covariates, a higher non-adherence score was significantly associated with increased HbA1c (b=0.33, p<0.001). When entering all non-adherent behaviors from the MMAS separately into the model being careless (b=0.04, p<0.04) was the stronger predictor of increased HbA1c levels.

Discussion: The results suggest that a sizeable proportion of T2D patients using basal insulin analogues engage in some form of non-adherent behavior; the most common being forgetfulness and carelessness with the administration of their medication. Each adhering for controlling confounders, the presence of non-adherent behaviors (particular carelessness) was associated with significantly higher levels of HbA1c. Improved adherence of these patients may result in clinical benefits.

Introduction

Type 2 diabetes (T2D) is a chronic, progressive condition which can lead to future complications and disability if not managed properly.

Prior research has suggested that lowering HbA1c to 7% or less is associated with a reduction in microvascular and macrovascular complications [1].

Although various treatments are available for the management of diabetes, adherence to medication is generally suboptimal, with some studies suggesting only 70% proportion of covered (PDC) [2].

However, research investigating the implications of medication non-adherence on HbA1c is currently lacking.

Objective

The aim of the current study was to determine the association between medication non-adherence and HbA1c levels among patients with T2D currently using basal insulin analogues.

Methods

Data source

- Data from the 2011 U.S. National Health and Wellness Survey (NHWS) were used in the analyses. The NHWS is a national, internet-based health survey conducted each year. The total sample size is 75,000.
- Respondents of the NHWS are recruited from an internet panel using a random stratified sampling framework to ensure the demographic composition identical to that of the U.S. Census.

Sample

- Of the 75,000 respondents from the NHWS, the following inclusion criteria were specified:
  - Reported a diagnosis of T2D
  - Currently using insulin glargine or insulin detemir
- The following exclusion criteria were specified:
  - Missing or unknown HbA1c values
  - Missing adherence data

Sociodemographics: Age, gender, ethnicity, marital status, education, and annual household income were also assessed.

Health history: Each respondent was asked to provide information on their height and weight, which was then converted to a level of body mass index (BMI). Respondents who chose not to provide their weight had their BMI set to missing. The Charlson comorbidity index (CCI) was also used to provide a summary index of overall comorbidity burden [3].

HbA1c: All respondents who reported a diagnosis of T2D were asked to provide their level of HbA1c. Although respondents had the option of selecting “don’t know”, these respondents were not included in the analyses as described above.

Medication non-adherence: The Monk Mediation Adherence Scale (MMAS), a patient-reported instrument with evidence of validity, was used to assess medication non-adherence [4]. The MMAS includes four items with yes or no response options:
  - “Do you ever forget to take your medicine?”
  - “Are you careless at times about taking your medicine?”
  - “When you feel better do you sometimes stop taking your medicine?”
  - “Sometimes if you feel worse when you take the medicine, do you stop taking it?”

The number of “yes” responses was summed to indicate the level of non-adherence.

Statistical analyses

- Descriptive data on the entire sample were reported using frequencies, percentages, means, and standard deviations.
- Multiple regression models were used to predict HbA1c using the MMAS, controlling for sociodemographics and health history variables.
- Statistical significance was set a priori at p<0.05.

Results

- A total of 768 patients met the study inclusion criteria (n=63 reported taking insulin glargine and n=127 reported taking insulin detemir). These patients were mostly male (64.71%), had a mean age of 61.39 (SD=9.85) and were predominantly obese (72.92%), and reported a mean HbA1c level of 7.31% (SD=1.41%) (see Table 1).

- Using the regression equation, HbA1c levels were estimated to be 7.12% if a patient engaged in none of the non-adherent behaviors assessed using the MMAS (see Figure 2). HbA1c levels were estimated to increase by 8.45% if a patient engaged in all four non-adherence behaviors (stopping when feel better, stopping when feel worse, being careless, and being forgetful).

Discussion

The results suggest that a sizeable proportion of T2D patients using basal insulin analogues engage in some form of non-adherent behavior, the most common being forgetfulness and carelessness with the administration of their medication.

Even after adjusting for confounding variables, being careless with taking medication was associated with significantly higher levels of HbA1c.

Treatments or other interventions which are associated with improved adherence among patients with T2D may result in real-world clinical benefits.

Limitations

- All data from the NHWS were patient reported and confirmation of diagnosis, treatment usage, and HbA1c were unavailable.
- The NHWS is cross-sectional so a causal relationship between non-adherence and higher HbA1c levels can only be speculated from the available data.

References