

Self-Reported Hypoglycemia Among Adults with Diabetes Mellitus

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BACKGROUND

- It is well documented that diabetes is a prevalent and costly disease^{1,2}
- Hypoglycemia is a leading limiting factor in the glycemic management of adults with T2DM who are treated with insulin³ or sulfonylurea⁴ therapy
- Hypoglycemia often causes recurrent physical morbidity, recurrent or persistent psychosocial morbidity, or both and sometimes causes death⁵
- Hypoglycemia is a barrier to achievement of glycemic control, and as a result, complications can occur despite aggressive therapy⁵
- This investigation was designed to provide current, real-world rates of hypoglycemia among adults with T2DM or T1DM

OBJECTIVES

- To evaluate the rate of self-reported hypoglycemia among adults with T2DM or T1DM
- To identify characteristics that may distinguish those at greater risk for hypoglycemia from those without hypoglycemia

METHODS

Study Design

- Cross-sectional analysis among SHIELD T2DM and T1DM respondents with or without hypoglycemia in the previous 12 months
- Study to Help Improve Early evaluation and management of risk factors Leading to Diabetes (SHIELD) is a 5-year population-based survey conducted to better understand the risk for the development of diabetes, and diabetes disease burden
 - Based upon a screening questionnaire mailed to 200,000 nationally representative households (TNS/NFO Household Panel), responses for 211,097 adults from 127,420 households were obtained (64% response rate)
 - A baseline survey was sent to 22,001 selected individuals derived from the screening respondents. Since 2005, annual SHIELD surveys have captured self-reported information on health status, attitudes and behaviors, quality of life, and anthropometry from this representative sample of the US population
 - The 2008 survey collected information from 14,921 individuals (71% response rate), and data from respondents with T2DM (n = 3,000) and T1DM (n = 182) were used in the analysis

Study Population

- Respondents were 18 years of age or older
- Self-reported diagnosis of T2DM or T1DM was based on being “told by a doctor, nurse or other healthcare professional that you have type 2 or type 1 diabetes”
- Among the diabetes sample, four cohorts were identified:
 - T2DM reporting hypoglycemia in the past 12 months
 - T2DM without hypoglycemia in the past 12 months
 - T1DM reporting hypoglycemia in the past 12 months
 - T1DM without hypoglycemia in the past 12 months

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METHODS (Continued)

Study Measures

- Hypoglycemia was defined as self-reported low blood sugar in the past 4 weeks and in the past 12 months
 - The number of episodes of hypoglycemia were reported for the past 4 weeks
- Respondents were considered overweight if their BMI was 25.0–29.9 kg/m² and obese if their BMI was ≥30 kg/m²
- Comorbid conditions were self-reported based on survey questions of being told by a healthcare professional that they had the condition

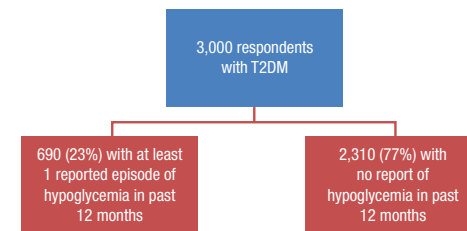
Statistical Analyses

- Respondents reporting at least 1 episode of hypoglycemia (low blood sugar) were compared with respondents who did not report hypoglycemia in the previous 12 months, separately for T2DM and T1DM respondents
- Comparisons between respondents with and without reported hypoglycemia were conducted using chi-square test for categorical variables and *t*-tests for continuous variables
- Statistical significance was set *a priori* as *p* <0.05

RESULTS

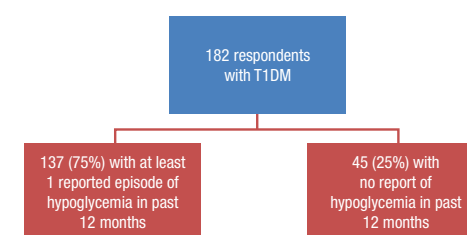
Prevalence of Hypoglycemia

Figure 1. T2DM respondents reporting hypoglycemia or no report of hypoglycemia



- There were 3,000 respondents with T2DM, and 23% reported at least 1 episode of hypoglycemia in the past 12 months (Figure 1)
- 20.5% of respondents with T2DM reported having hypoglycemia in the past 4 weeks
- Over the 4-week period, T2DM respondents reported an average of 6.4 episodes of hypoglycemia

Figure 2. T1DM respondents reporting hypoglycemia or no report of hypoglycemia

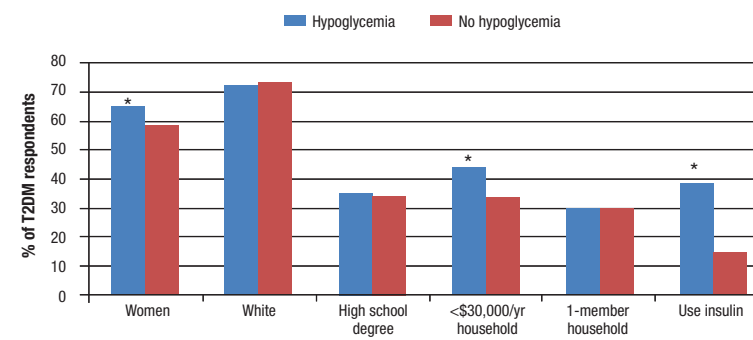


- There were 182 respondents with T1DM, and 75% reported at least 1 episode of hypoglycemia in the past 12 months (Figure 2)
- 72.0% of respondents with T1DM reported having hypoglycemia in the past 4 weeks
- Over the 4-week period, T1DM respondents reported an average of 7.1 episodes of hypoglycemia

RESULTS (Continued)

Characteristics Distinguishing Hypoglycemia

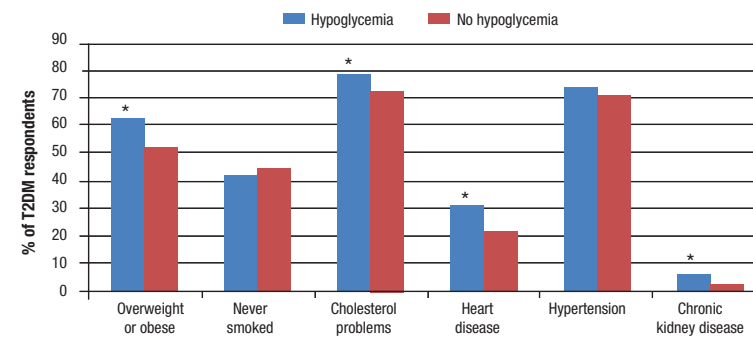
Figure 3. Demographic characteristics of T2DM respondents with and without reported hypoglycemia



**p* <0.001

- Among T2DM respondents, hypoglycemia was significantly associated with female gender (65% vs. 58%), lower household income (44% vs. 34% with income <\$30,000/year), and greater insulin use (39% vs. 15%) than among those without hypoglycemia (Figure 3)
- There was no difference (*p* >0.05) with respect to age (mean age = 63 [SD 12] vs. 64 [12]), race, education, and household size

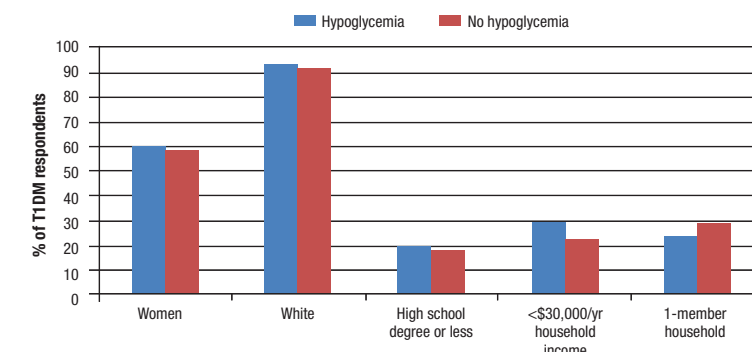
Figure 4. Clinical characteristics of T2DM respondents with and without reported hypoglycemia



**p* <0.001

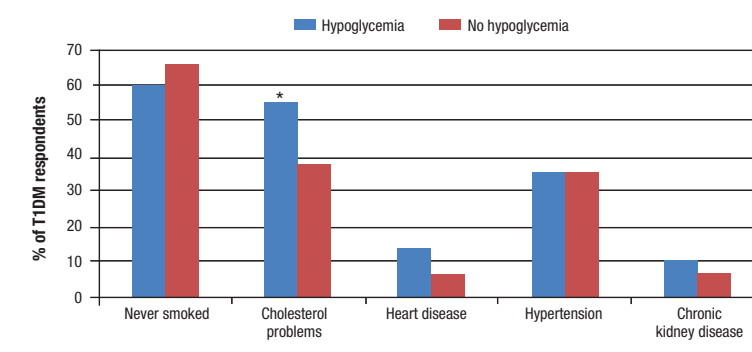
- Among T2DM respondents, hypoglycemia was significantly (*p* <0.001) associated with being overweight or obese (63% vs. 52%), more cholesterol problems, heart disease, and chronic kidney disease than among those without hypoglycemia (Figure 4)
- T2DM respondents with reported hypoglycemia had more comorbid conditions than those without hypoglycemia; mean number: 7.3 vs. 5.9
- T2DM respondents reporting hypoglycemia had a longer diabetes duration than those without hypoglycemia (13.7 vs. 11.0 years) (*p* <0.001)
- There was no difference (*p* >0.05) with respect to smoking status and hypertension

Figure 5. Demographic characteristics of T1DM respondents with and without reported hypoglycemia



- Among T1DM respondents, there was no difference (*p* >0.05) between those with and without hypoglycemia with respect to gender, race, education, household income, and household size (Figure 5)
- T1DM respondents reporting hypoglycemia were significantly older (mean age, 47 years) than those without hypoglycemia (43 years) (*p* <0.05)

Figure 6. Clinical characteristics of T1DM respondents with and without reported hypoglycemia



**p* <0.05

- Among T1DM respondents, those with hypoglycemia had cholesterol problems (56% vs. 38%), compared with those without hypoglycemia (*p* <0.05) (Figure 6)
- T1DM respondents with hypoglycemia had significantly more comorbid conditions (mean: 5.1 conditions), compared with those without hypoglycemia (3.5 conditions) (*p* <0.05)
- There was no difference (*p* >0.05) with respect to smoking status, BMI (mean: 27.7 vs. 27.6 kg/m²), and duration of diabetes (mean: 35.6 vs. 31.7 years)

LIMITATIONS

- Diagnosis of diabetes and other comorbid conditions, and hypoglycemia were self-reported and could not be validated with medical record review or administrative claims data. However, this bias is similar between the groups compared in this study
- Information on the severity of hypoglycemia, blood glucose levels around the time of the hypoglycemia, and causes of hypoglycemia were not collected in the SHIELD survey, thereby limiting the understanding of the impact of hypoglycemia
- Household panels, like the TNS/NFO panel, tend to under-represent the very wealthy and very poor segments of the population and do not include military or institutionalized individuals

SUMMARY

- 23% of T2DM respondents and 75% of T1DM respondents reported experiencing hypoglycemia in the past 12 months
- The following characteristics distinguished T2DM respondents with hypoglycemia from those without hypoglycemia:
 - Female gender, low household income
 - Greater number of comorbid conditions, in particular, cholesterol problems, heart disease, and chronic kidney disease
 - Overweight or obesity
 - Longer duration of diabetes, and use of insulin
- Older age, greater number of comorbid conditions, and greater proportion with cholesterol problems distinguished T1DM respondents with hypoglycemia from those without hypoglycemia

CONCLUSIONS

- Hypoglycemia is prevalent and frequent among adults with T2DM and T1DM
- Further research is needed to confirm the association of patient characteristics (e.g., female gender, number of comorbid conditions, overweight or obesity) evaluated in routine clinical practice with hypoglycemia

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LIST OF ABBREVIATIONS

BMI	Body mass index
SHIELD	Study to Help Improve Early evaluation and management of risk factors Leading to Diabetes
T1DM	Type 1 diabetes mellitus
T2DM	Type 2 diabetes mellitus
TNS/NFO	Taylor Nelson Sofres/ National Family Opinion

Disclosure: Authors of this presentation have the following to disclose concerning possible financial or personal relationships with commercial entities that may have a direct or indirect interest in the subject matter of this presentation:
Susan Grandy: Employee – AstraZeneca LP; Kathleen Fox: Consultant – AstraZeneca LP;
Andrew Green: Advisor – AstraZeneca LP; Helena Rodbard: Advisor and Speaker's Bureau – AstraZeneca LP
Elise Hardy: Employee – AstraZeneca LP