

Association of Self-Reported Hypoglycemia and Quality of Life and Depression Among Adults with Type 2 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 type 2 diabetes 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 precludes true glycemic control, and as a result, complications can occur despite aggressive therapy⁶
- This investigation was designed to determine if hypoglycemia had a negative impact on health-related quality of life and depression among adults with type 2 diabetes mellitus

OBJECTIVE

- To examine the association of hypoglycemia with HRQOL and depression among T2DM adults with and without hypoglycemia

METHODS

Study Design

- Cross-sectional analysis among SHIELD T2DM 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), a 5-year population-based survey conducted to better understand the risk for the development of diabetes, as well as 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) were used in the analysis

Study Population

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

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
- HRQOL was assessed through the Short Form-12 (SF-12)
 - 12-item measure of overall health status with a recall period of 4 weeks
 - Scale ranges from 0–100, with norm-based scoring (population mean = 50) for PCS and MCS scores
 - Higher scores indicate better QOL
- Depression was assessed through the Patient Health Questionnaire (PHQ-9)
 - 9 signs and symptoms of depression from the DSM-IV
 - Higher scores indicate increasing severity of depression
 - Scores of 5–9 = minimal depression; 10–14 = minor depression; 15–19 = major depression, moderately severe; and ≥20 = major depression, severe
- Overweight was defined as BMI of 25.0–29.9 kg/m², and obesity was defined as a BMI ≥30 kg/m²
- Comorbid conditions were self-reported based on survey questions of being told by a healthcare professional that they had the condition

METHODS (Continued)

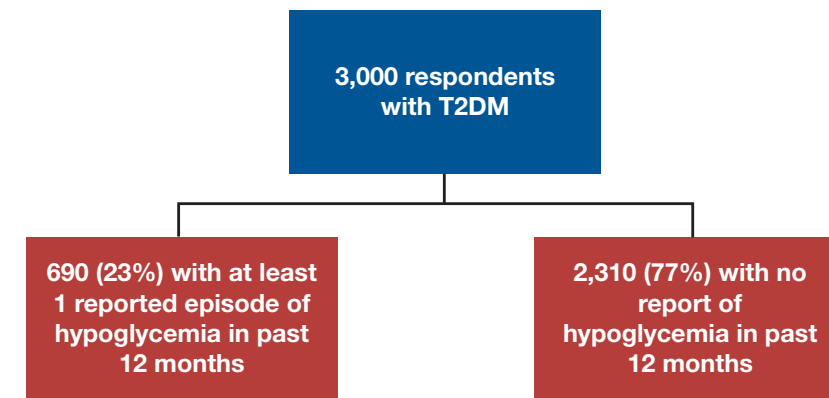
Statistical Analyses

- T2DM respondents reporting at least 1 episode of hypoglycemia (low blood sugar) were compared with T2DM respondents who did not report hypoglycemia in the previous 12 months
- 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 Among T2DM Respondents

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)

Table 1. Characteristics of T2DM respondents with and without reported hypoglycemia

Characteristics	Hypoglycemia in past 12 months (n = 690)	No hypoglycemia in past 12 months (n = 2,310)
Age, mean (SD)	62.6 (11.9)	63.5 (11.7)
Women, %	65*	58
White, %	72	73
Education, high school degree or less, %	35	34
Household income <\$30,000, %	44*	34
Overweight or obese, %	63*	52
Number of comorbid conditions, mean (SD)	7.3 (3.4)*	5.9 (3.0)
Atherosclerosis, %	8*	4
Cholesterol problem, %	78*	73
Heart disease, %	31*	22
Hypertension, %	74	71
Duration of diabetes, years, mean (SD)	13.7 (9.5)*	11.0 (8.3)
Current insulin use, %	39*	15

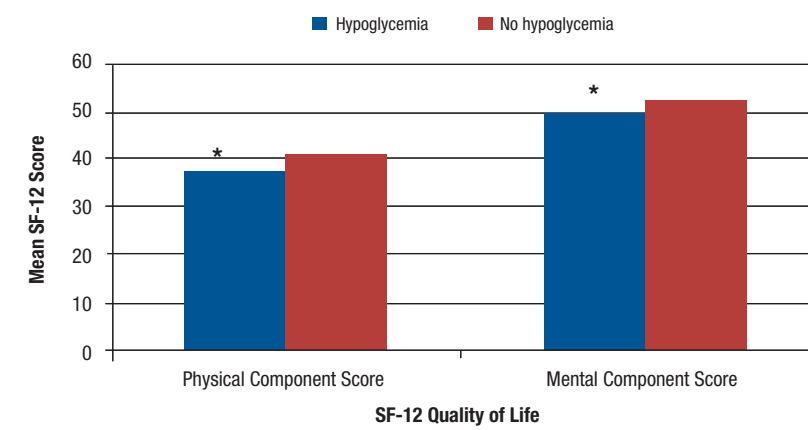
*p < 0.05

- A significantly larger proportion of T2DM respondents reporting hypoglycemic episodes were women, had lower income, were overweight or obese, had more comorbid conditions, had longer duration of diabetes, and received insulin (Table 1)

RESULTS (Continued)

Health-related Quality of Life

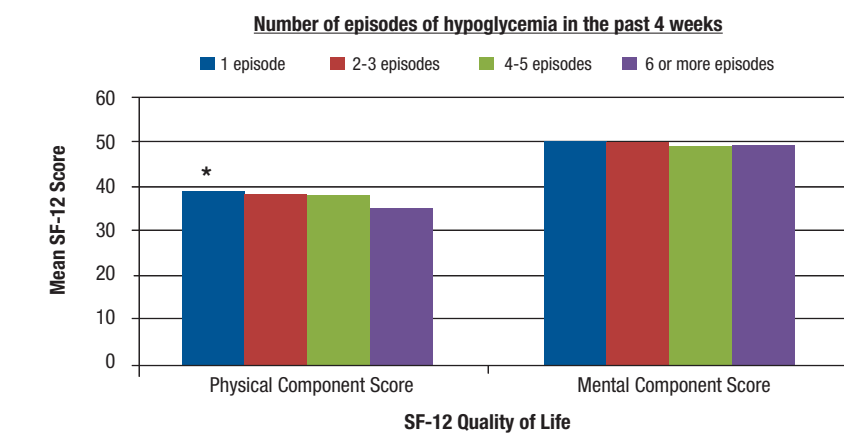
Figure 2. SF-12 scores for T2DM respondents with and without reported hypoglycemia



*p < 0.001 for comparison of hypoglycemia group vs. no hypoglycemia group

- Respondents who reported hypoglycemia in the past 12 months had lower SF-12 scores for both physical health and mental health, compared with those who reported no hypoglycemia (p < 0.001) (Figure 2)

Figure 3. SF-12 scores among T2DM respondents who reported at least 1 episode of hypoglycemia in the past 4 weeks by number of episodes

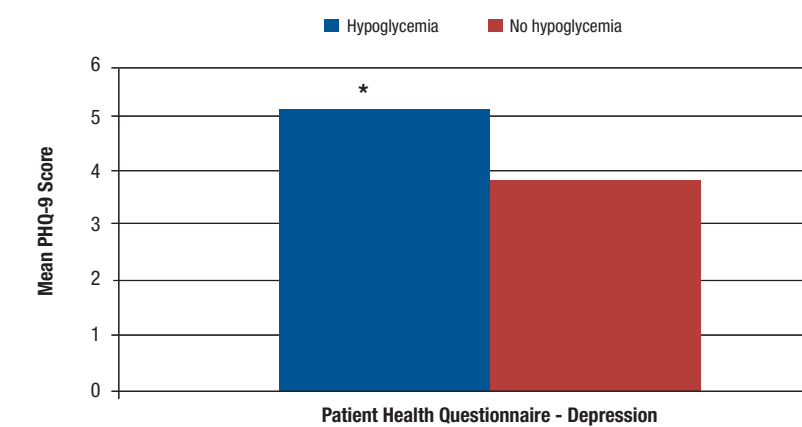


*p < 0.05 for comparison across number of episodes

- Mean PCS scores decreased as the number of hypoglycemic episodes increased (p = 0.03) (Figure 3)
- Mean MCS scores did not differ significantly across the number of hypoglycemic episodes (p = 0.09)

Depression

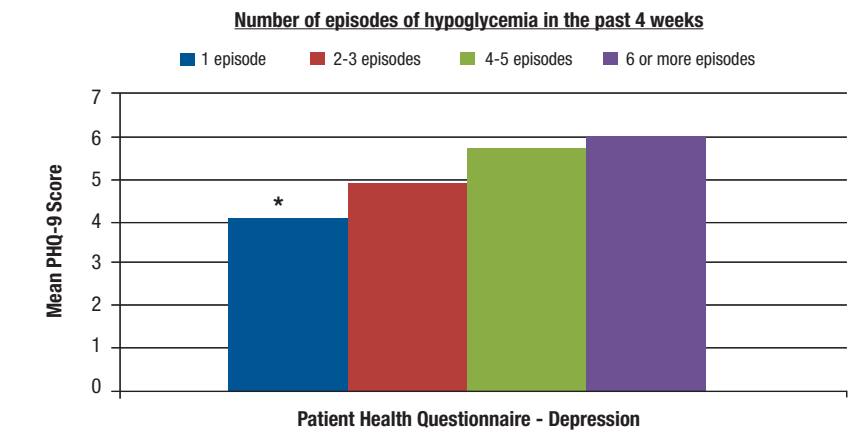
Figure 4. Patient Health Questionnaire scores for depression for T2DM respondents who reported hypoglycemia vs. no reports of hypoglycemia



*p < 0.001 for comparison of hypoglycemia group vs. no hypoglycemia group

- Depression scores (PHQ-9) were significantly higher among respondents reporting hypoglycemia in the past 12 months, compared with respondents who did not report hypoglycemia (p < 0.001) (Figure 4)
- Significantly more respondents reporting hypoglycemia had moderately severe to severe depression (PHQ-9 scores ≥15), compared with respondents without hypoglycemia; mean score of 10.1 vs. 5.1, respectively

Figure 5. PHQ-9 scores among T2DM respondents who reported at least 1 episode of hypoglycemia in the past 4 weeks by number of episodes



*p < 0.05 for comparison across number of episodes

- Mean depression scores increased as the number of reported hypoglycemic episodes increased (p = 0.01) (Figure 5)

LIMITATIONS

- Diagnosis of diabetes, 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
- 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

- SF-12 scores were significantly lower among T2DM respondents reporting hypoglycemia than among those who did not report hypoglycemia
- Physical Component Summary scores for physical quality of life decreased as the number of hypoglycemic episodes increased
- Depression scores were significantly higher among T2DM respondents reporting hypoglycemia, compared with those who did not report hypoglycemia
- Depression scores increased as the number of reported hypoglycemia episodes increased

CONCLUSIONS

- T2DM respondents reporting hypoglycemia also reported lower quality of life, both physical and mental health, and greater burden of depression than respondents who did not report hypoglycemia
- These findings suggest that the impact of hypoglycemia on quality of life and depression should be taken into consideration in the management of T2DM patients in routine clinical practice settings

References

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List of Abbreviations

BMI	Body mass index	PHQ-9	Patient Health Questionnaire-9
DSM-IV	Diagnostic and Statistical Manual of Mental Disorders-IV	SF-12	Short Form-12
HRQOL	Health-related quality of life	SHIELD	Study to Help Improve Early evaluation and management of risk factors Leading to Diabetes
MCS	Mental Component Summary	T2DM	Type 2 diabetes mellitus
PCS	Physical Component Summary		

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