IP13

Prevalence of Fear of Hypoglycemia in Adults with T1D: Results of a Newly Developed Screener

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BACKGROUND

- Fear of hypoglycemia (FoH) impedes psychological well-being, quality of life, and diabetes management.[1-3]
- American Diabetes Association (ADA) recommends screening for FoH using standardized and validated tools and in the case of positive findings, referring to a mental health provider.[4]
- Existing FoH measures have limited uptake in clinical practice and lack thresholds informing action.[5]
- We developed and validated a short, actionable 9-item screener that assesses two domains of FoH – "worry" (6 items) and "behavior" (3 items).[6]
- The FoH screener showed good internal consistency (Cronbach's α = 0.88)[5,6] and is hoped to be used in clinical practice.

OBJECTIVE

To understand FoH in a real-world clinical setting, we evaluated the prevalence of FoH and the associated demographic and clinical characteristics in adult patients with type 1 diabetes (T1D) using the newly validated FoH screener.

METHODS

- **Eligibility Criteria**
  - Age ≥ 18 years; diagnosed with T1D for ≥ 12 months; A1c measurement within the last 12 months.
  - Reside in the United States; fluent in written English; not currently pregnant.
- **Recruitment and Survey Procedure**
  - Recruited from three T1D Exchange QI Collaborative (T1DX-QI) adult clinics.
  - Collected online survey and consent.
- **Participant Self-reported Measures**
  - Demographic characteristics.
  - Diabetes characteristics
    - T1D duration, A1c, related comorbidities, glucose monitoring methods and frequency, and insulin delivery methods.
    - Impaired awareness of hypoglycemia measured with Gold Score[7] [responses range from "Always aware (1)" to "Never aware (7)"].
    - Low-bound and high-bound comfortable blood glucose levels.
    - Number of severe hypoglycemic events (SHE) in the past 12 months.
  - Validated fear of hypoglycemia (FoH) screener.[5,6]

KEY RESULTS

Descriptive statistics of FoH screener scores

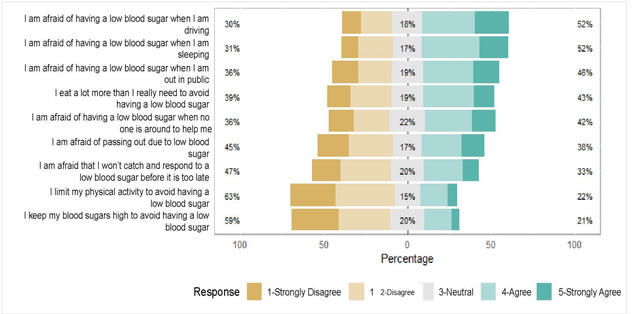
Scale or Subscale	Category	Score range	N (%)
Total Score	Low FoH	9 - 30	387 (70)
	High FoH	31 – 44	166 (30)
Worry Score	Low FoH	6 – 23	418 (76)
	High FoH	24 – 30	135 (24)
Behavior Score	Low FoH	3 - 9	398 (72)
	High FoH	10 - 15	155 (28)

Abbreviations: FoH = Fear of hypoglycemia; N = Number of participants

- Participants were categorized as high vs. low FoH based on the following scores:
  - Total scale - 30
  - Worry subscale - 23
  - Behavior subscale – 9
- Of the 553 survey participants, 30% had high FoH-Total, 24% had high FoH- Worry, and 28% had high FoH-Behavior score.

KEY RESULTS

Likert plot for FoH screener item distribution by response frequency



Items were rated on a 5-point scale (1= Strongly Disagree to 5= Strongly Agree); Abbreviations: FoH= Fear of hypoglycemia

- Most of the participants either agreed or strongly agreed that they experienced FoH while driving, sleeping, when they were out in public, or alone.
- Most participants also either agreed or strongly agreed that they ate more than needed to avoid low blood sugar levels.

CONCLUSIONS

- One-third of participants had high total FoH scores.
- Participants with more comorbidities and higher BMI reported higher FoH scores.
- Participants with high FoH scores reported higher A1c, more frequent severe hypoglycemic events, higher impaired awareness of hypoglycemia, and higher levels of comfortable low-bound blood glucose.
- Using this tool in a clinical setting could help identify FoH in adults with T1D and inform timely interventions.

LIMITATIONS

These findings might not be generalizable to the other populations because of the limited diversity of study participants.

Statistical Analysis

- Descriptive statistics:
  - Frequencies and percentages for categorical measures.
  - Means and standard deviations for continuous measures.
- Multiple regression analyses:
  - Outcome variables: A1c, number of comorbidities, low-bound comfortable blood glucose levels and high-bound comfortable blood glucose levels.
  - Independent variable: High total FoH (total FoH score > 30).
  - Covariates: age, gender, body mass index (BMI), duration of T1D, insulin pump use, and continuous glucose monitor (CGM) use.
- Pearson correlations were calculated between screener scores and participant characteristics.
- Two-sided significance level: 0.05

Results

Characteristics of survey participants (n=553)

Participant Characteristics	N	Mean [SD] or n (%)
Age, years	553	38.9 [14.2]
Gender	553	
Female		357 (64.6)
Male		191 (34.5)
Other		5 (0.9)
Race	552	
White		488 (88.4)
African American		12 (2.2)
Other		52 (9.4)
Ethnicity	552	
Hispanic or Latino		46 (8.3)
Not Hispanic or Latino		506 (91.7)
Body Mass Index (BMI), kg/m^2	548	26.6 [5.1]
Private Health Insurance	553	432 (78.1)
Insulin Pump User	553	417 (75.4)
Continuous Glucose Monitor User	553	515 (93.1)
Comfortable Blood Glucose Level, mg/dL	551	
Low		84.9 [17.0]
High		170.1 [44.0]
SHE in the past 12 months	508	1.26 [5.7]
Self-reported A1c, %	552	7.04 [1.2]

Abbreviation: N = Total number of patients; SD = Standard deviation; A1c = Glycated hemoglobin; SHE = Severe hypoglycemic events.

- Mean age of participants was 38.9 years.
- Most participants were female (64.6%), white (88.4%), non-Hispanic (91.5%), and had private health insurance (78.1%).
- Most participants used an insulin pump (75.4%) and CGM (93.1%) and the mean self-reported A1c was 7.04%.

Results

Multiple regression analyses predicting diabetes outcomes from total FoH score (High vs. Low)

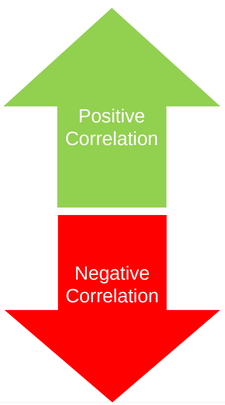
Outcome Variables	Independent variable: High total FoH	
	B	R^2
Self-reported A1c, %	0.559***	0.11
Number of comorbidities	1.085***	0.18
Low-bound blood glucose level	5.313**	0.03
High-bound blood glucose level	6.065	0.01

***p<0.001, **p<0.01
Abbreviations: FoH = Fear of hypoglycemia, A1c = Glycated hemoglobin
Note: B=Unstandardized Regression Coefficient; R2=Coefficient of determination; Each outcome variable was entered into a linear regression model with High total FoH (being 1 if total FoH score >30) as an independent variable (all models controlled for age, gender, body mass index (BMI), duration of T1D, pump use, and continuous glucose monitor (CGM) use).

- Participants with high total FoH reported higher A1c, more comorbidities, and higher low-bound blood glucose level than those with low total FoH.

Results

Correlations between total FoH scores and study measures



- Higher A1c (r = 0.21)
- More comorbidities (r = 0.19)
- Higher level low-bound blood glucose (r = 0.15)
- Higher Gold score (r = 0.12)
- More frequent SHE in previous 12 months (r = 0.09)
- Higher BMI (r = 0.09)

- Younger age (r = -0.09)
- Lower diabetes duration (r = -0.17)

Abbreviations: r= Correlation coefficient; A1c= glycated hemoglobin; SHE= Severe hypoglycemic event; BMI=Body mass index.
Note: FoH was not significantly correlated with insulin pump use (r = 0.02) or continuous glucose monitor (CGM) use (r = -0.08); Gold score is hypoglycemia awareness measure

- Higher total FoH scores were associated with higher A1c, more comorbidities, and higher levels of low-bound comfortable blood glucose.
- Higher total FoH scores were also associated with more frequent severe hypoglycemic events and greater impaired awareness of hypoglycemia.

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Disclosures:
Megan Peter, Nicole Rioles, Huyen Nguyen, Katherine Chapman, and Wendy Wolf are employees of T1D Exchange; Jingwen Liu is a former employee of T1D Exchange; Magaly Perez, Jiat Ling Poon, and Beth Mitchell are employees and stockholders of Eli Lilly and company.

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