Gender Differences in Strategies to Prevent Physical Activity–Related Hypoglycemia in Patients With Type 1 Diabetes: A BETTER Study

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In people living with type 1 diabetes (T1D), hypoglycemia is a significant acute complication of insulin therapy and is further accentuated by physical activity (PA) (1). Technologies such as continuous subcutaneous insulin infusion (CSII) and continuous glucose monitoring (CGM) systems facilitate blood glucose management during PA (1). Decreasing insulin on board by reducing preactivity basal and/or bolus insulin, balanced with carbohydrate intake, helps manage glucose levels during PA (1). Studies show that gender plays a role in diabetes management, as men and women may have different preferred treatment options (2), psychological adjustments to T1D, and different barriers, motivations, preferences, and goals for PA (3). The objectives of this study were to determine and compare the most common strategies (type and frequency) used to prevent PA-related hypoglycemia and to compare the most common barriers to PA between self-identified men and women.

This cross-sectional study used data available from the Behaviors, Therapies, Technologies, and Hypoglycemic Risk in Type 1 Diabetes (BETTER) registry, collected from February 2019 to March 2021 through online questionnaires (https://www.maelstrom-research.org/study/better). Independent t tests and χ² tests with Bonferroni corrections as well as multivariate regressions were used to compare the two groups (men vs. women). Mann-Whitney U tests were used for nonnormally distributed data. In total, 209 men (35.8%) and 375 women (64.2%) were included in the analysis (mean age [men 48.6 ± 15.3, women 41.6 ± 15.3 years; P < 0.001], T1D duration [men 25.4 ± 16.1, women 23.0 ± 15.1 years; P = 0.064], BMI [men 26.6 ± 4.7, women 25.9 ± 5.2 kg/m²; P = 0.094], reporting HbA₁c < 7.0% [men 39.2%, women 29.9%; P < 0.05], using CSII [men 46.4%, women 36.8%; P = 0.025], using CGM system [men 81.3%, women 78.7%; P = 0.276], and reporting at least 150 weekly min of PA [men 26.5%, women 23.2%; P = 0.292]).

The most common strategy to prevent PA-related hypoglycemia used by both genders was to measure glucose more frequently (either capillary blood glucose or CGM) (men 76.6%, women 76.8%; P = 0.946). A greater proportion of men reported using additional carbohydrates before (men 70.8%, women 62.1%; P = 0.035) and during (men 56.5%, women 42.7%; P = 0.001) PA. About 40.7% of men and 39.5% of women (P = 0.776) used carbohydrate intake after exercise. Men also reported snacking more frequently than women, as shown in Fig. 1A. Reducing prior meal insulin was a less common strategy, with only half of the participants reporting its use (men 55.0%, women 57.3%; P = 0.589). Less than 10% (men 8.1%, women 8.8%; P = 0.783) reported reducing pump basal rates either prior to, during, or after PA (if applicable). The frequency of adjusting insulin was similar between both groups (Fig. 1B). The least common strategy used was to add sprints to training (men 2.9%, women 3.5%; P = 0.697).

Overall, being a woman was associated with perceiving more barriers to PA and with performing less PA. Using multiple linear regressions, adjusted for T1D duration, BMI, total PA level, use of CSII, and use of CGM, being a woman was associated with a 0.51-point higher score (95% CI 0.30, 0.72) on the Barriers to Physical Activity in Type 1 Diabetes (BAPAD-1) questionnaire (4). Men and women both ranked hypoglycemic risk (men 3.19 ± 2.00, women 3.99 ± 2.00; P < 0.01) and...
weather conditions (men 3.30 ± 1.96, women 3.76 ± 2.00; P = 0.007) as the main barriers to PA. Using a similar regression model, being a woman was associated with 28.4 (95% CI −52.0, −4.8) fewer weekly minutes of PA.

These results confirmed that snacking is a more common strategy to reduce PA-related hypoglycemia than reducing insulin doses. More men than women report consuming extra carbohydrates, both before and during PA, to prevent hypoglycemia; men also report using this strategy more often. These findings may reflect the many practical factors associated with snacking compared with reducing insulin. While we did not explore reasons for using each strategy, it could be hypothesized that the higher prevalence of body image dysmorphia and eating disorders in women partially explains the lower carbohydrate consumption for PA-related hypoglycemia prevention (5). This study has several limitations including recall bias, not including PA intensity and socioeconomic determinants, and having a homogenous ethnic sample (94.5% Caucasian).

The gender-related differences in perceived barriers toward PA and preferred management strategies to reduce associated hypoglycemic risk suggest that gender-specific education to support the safe adoption of an active lifestyle is needed. Additional research is needed on how to deliver gender-specific advice around PA.

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for the integrity of the data and the accuracy of the data analysis

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References