Differences in Perceived Quality of Sleep and Satisfaction with Insulin Delivery Device in People With Diabetes

Harsimran Singh PhD,* Michelle Manning MA,* Haidee Sanchez BSc,* Keaton Stoner BS,† Steph Habif EdD MS*

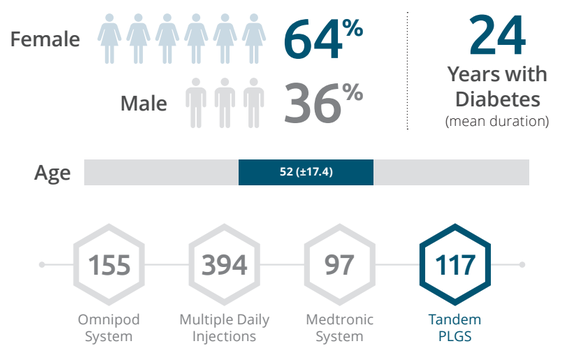
Introduction

Sleep is emerging as an important modifiable factor that is essential for optimizing diabetes outcomes. Poor sleep quality has been associated with increased symptoms of negative affect/stress, impaired quality of life, disease management, and increased HbA1c in type 1 and type 2 diabetes.

Considering this growing evidence, the American Diabetes Association in their Standards of Medical Care has emphasized the need to assess sleep pattern and duration as part of the medical evaluation of someone with diabetes.

It has been suggested that with the advent of cutting-edge diabetes technology, people with diabetes may experience fewer sleep disruptions that are directly related to their diabetes (e.g. glucose fluctuations). However, there is very little published literature regarding sleep-related implications of new-age diabetes management devices.

FIGURE 1: Demographics. Study participants included people with T1D and T2D.



Methods

People with type 1 and type 2 diabetes (PwD) using insulin therapy were invited from a diabetes research company's (dQ&A) 2019 US-based panel. Participants completed questionnaires including items on perceived quality of sleep (QoS) and satisfaction with their current insulin delivery device (IDD). Both items had a Likert response scale (1-10) with higher values suggesting better QoS or greater satisfaction with IDD.

Quantitative data were analyzed using analysis of variance and multiple-regression analysis. Qualitative content analysis was used for examining open-ended responses.

Results

Demographics / Diabetes-Specific Information

The sample included 763 participants. The majority were Caucasian (88%), female (64%), married (67%), had type 1 diabetes (71%) and were using a continuous glucose monitor (CGM) (67%). Mean age for the sample was 52 years (SD = 17.4) and diabetes duration was 24.5 years (SD = 14.7). Participants were using a variety of IDDs (Figure 1) including multiple daily injections (MDI), patch pumps (Omnipod System), predictive low glucose suspend (PLGS) systems (t:slim X2™ insulin pump with Basal-IQ™ technology) and hybrid closed-loop systems (MiniMed 670G System).

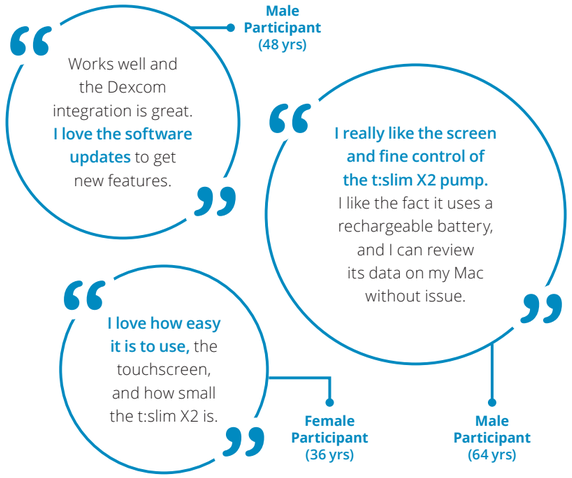
Quantitative Outcomes by Type of IDD

Analysis of variance demonstrated that participants using the t:slim X2 pump with Basal-IQ technology reported significantly better QoS compared to MDI (Mdiff = 2.12, p<.001), Medtronic 670G (Mdiff = 1.96, p<.001), and Omnipod System users (Mdiff = 1.27, p<.001). (Table 1)

TABLE 1: Perceived Quality of Sleep. By type of IDD for the study sample.‡

Insulin Delivery Device	Mean Scores (SD)
Predictive Low Glucose Suspend System (t:slim X2 insulin pump with Basal-IQ technology)	8.93 (1.7)
Patch Pump (Omnipod System)	7.66 (1.9)
Hybrid Closed-Loop System (Medtronic 670G)	6.97 (2.7)
Multiple Daily Injections	6.81 (2.4)

FIGURE 2: Participant Quotes. Factors affecting IDD-related satisfaction and trust.



In terms of IDD-related satisfaction, those using the t:slim X2 pump with Basal-IQ technology reported significantly greater satisfaction with their device compared to MDI (Mdiff = 1.03, p<.001), Medtronic 670G (Mdiff = 1.31, p<.001), and Omnipod System (Mdiff = 0.48, p<.001). Multiple regression analysis highlighted QoS as a significant predictor of IDD-related satisfaction (β=.13, p<.001).

Qualitative Outcomes

Qualitative analysis of open-ended questions on IDD-related satisfaction and trust highlighted other features valued by participants, including convenient device software updates, user-friendly data uploads, and ability to use the device discreetly (Figure 2).

Conclusions

Study results underline an important relationship between QoS and an individual's satisfaction with their IDD in our sample of older adults. Discussion around sleep-related implications of IDDs with PwD is recommended, as these may have an impact on their long-term use and overall diabetes management.

* Tandem Diabetes Care, San Diego. † dQ&A - The Diabetes Research Company, San Francisco.
‡ Questionnaire item "My insulin delivery device helps me sleep better at night" was scored on a Likert response scale (1-10) with higher values suggesting better perceived quality of sleep.

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