Dra. Marta Camacho Cardeñosa.
Instituto Maimónides de Investigación Biomédica de Córdoba.
Department of Endocrinology and Nutrition.
Hospital Universitario Reina Sofía de Córdoba (Córdoba, Spain).

Dra. Alba Camacho Cardeñosa.
Instituto de Investigación Biosanitaria de Granada.
Instituto Mixto Universitario Deporte y Salud,
Universidad de Granada (Granada, Spain).

Physical activity and digital health:

when technology helps improve diabetes management

PHYSICAL ACTIVITY AND EXERCISE IN PEOPLE WITH DIABETES

According to current recommendations for self-management in people with diabetes (PwD), lifestyle interventions—including nutrition, physical activity, exercise, and stress management—are among the most effective strategies for improving glycemic control, which is usually assessed by glycated hemoglobin »

» (HbA1c) (1). In this context, both physical activity and exercise are considered essential tools for the comprehensive management of diabetes (2).

Although the terms are often used interchangeably, they should be distinguished. **Physical activity** encompasses any bodily movement produced by skeletal muscles that involves energy expenditure, whereas exercise is a specific form of **physical activity** that is planned, structured, and repetitive and is intended to improve or maintain physical fitness, including muscular strength, cardiorespiratory endurance, and flexibility (3).

Incorporating these self-management strategies can substantially reduce the personal impact of diabetes. However, to achieve the greatest benefit, both nutrition and **physical activity should be tailored to each person's individual characteristics**, as the body's response to insulin, diet, or physical activity can vary considerably between individuals (4). For this reason, glucose monitoring is particularly important during exercise and everyday activities, as it allows safer treatment adjustments, helps prevent episodes of hypoglycemia or hyperglycemia, and promotes better disease control.

DIGITAL HEALTH TOOLS DURING PHYSICAL ACTIVITY

Despite the demonstrated benefits of physical activity, **most PwD, particularly younger individuals, do not achieve the minimum recommended levels** (5). The main reasons include difficulties maintaining adequate glycemic control before, during, and after physical activity, as well as fear of hypoglycemic episodes (6).

In this context, the Sociedad Española de Endocrinología y Nutrición (SEEN) highlights the role of continuous glucose monitoring systems as highly useful tools for engaging in physical activity more safely. These devices provide real-time information on glucose trends, facilitating adjustments in insulin doses and carbohydrate intake and helping prevent hypoglycemia, particularly episodes that may occur several hours after exercise (7).

However, the glycemic response to physical activity is not the same for every person or every type of activity. Factors such as the type, intensity, and duration of exercise can have a substantial effect on glucose levels. Therefore, digital health tools that integrate diabetes-related information with physical activity data—such as step count, heart rate, or energy expenditure—can provide valuable information for personalizing therapeutic decisions and improving self-management (8).

KEY CONSIDERATIONS WHEN CHOOSING A USEFUL DIGITAL TOOL FOR DIABETES MANAGEMENT

A range of physical activity applications are available that are designed to record and monitor aspects of an active lifestyle. They can collect information on step count, heart rate, energy expenditure, and the duration and intensity of physical activity, which may facilitate the adoption and maintenance of health-promoting behaviors such as regular physical activity and improved physical fitness (9).

However, in the context of diabetes, engaging in physical activity or exercise presents an additional challenge because it can cause substantial changes in glucose levels. Correctly adjusting insulin doses, planning carbohydrate intake, and preventing episodes of hypoglycemia during and after exercise are decisions that are often made through trial and error.

Diabetes-specific applications are therefore needed to provide added value by combining metabolic information with physical activity data, thereby facilitating more personalized recommendations tailored to each situation. In addition, integration with glucose sensors and wearable devices can provide more comprehensive information to support decision-making during exercise (8).

Figure 1 illustrates a series of applications designed to guide PwD during periods of physical activity or exercise by combining diabetes-specific information with physical fitness data sources.

INTERPRETING TRENDS WITHOUT BECOMING OBSESSED WITH DATA

Digital tools can help PwD better understand how nutrition, treatment, and physical »

PHYSICAL ACTIVITY SHOULD BE ADAPTED TO EACH PERSON'S INDIVIDUAL CHARACTERISTICS, AS THE BODY'S RESPONSE TO INSULIN, DIET, OR PHYSICAL ACTIVITY CAN VARY CONSIDERABLY BETWEEN INDIVIDUALS

ENGAGING IN PHYSICAL ACTIVITY OR EXERCISE POSES AN ADDITIONAL CHALLENGE BECAUSE IT CAN CAUSE SUBSTANTIAL CHANGES IN GLUCOSE LEVELS

» activity affect their glucose levels. However, the value of these technologies does not lie in continuously accumulating data, but rather in using them to identify patterns and trends that facilitate self-management and decision-making.

Several studies show that PwD particularly value applications that present information in a simple, personalized, and useful manner for everyday life. By contrast, excessive information, the need for continuous data entry, or tools that are poorly adapted to individual needs can cause frustration and hinder long-term use (10).

Technology should therefore be regarded as an ally that allows us to better understand individual responses to exercise, nutrition, and treatment and to support safer, better-informed decisions in diabetes management (1). D

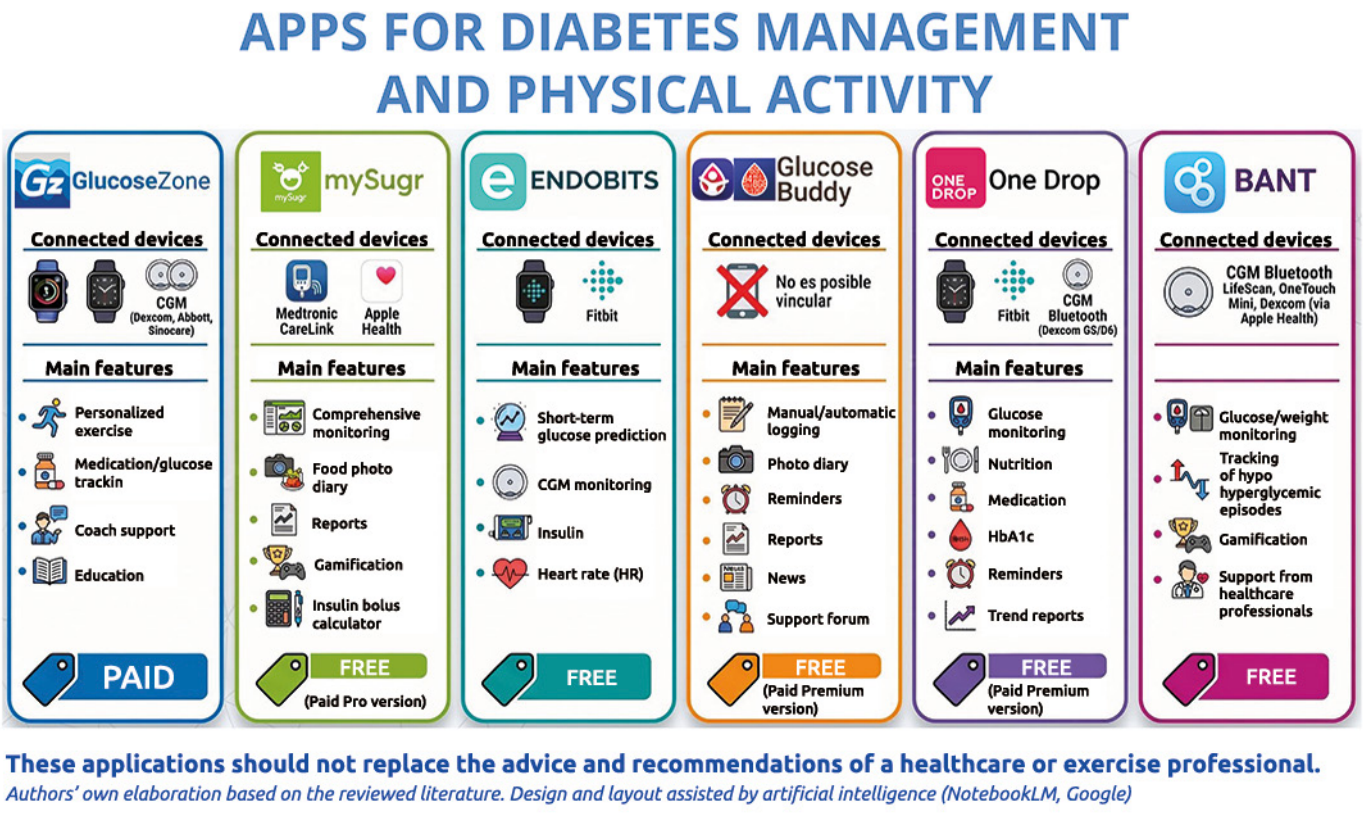

FIGURE 1

CONCLUSIONS:

1. Physical activity is a fundamental tool for diabetes management and self-care.
2. The glucose response to exercise varies between individuals; therefore, glucose monitoring is essential for exercising safely.
3. Diabetes-specific applications provide more useful information than general physical activity tools by integrating data on glucose, treatment, and exercise.
4. The value of digital health lies not in collecting more data, but in helping users interpret trends and patterns.
5. Technology can become an ally in making safer, better-informed decisions during physical activity.

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