A Commentary on “Better TIR, HbA1c, and Less Hypoglycemia in Closed-loop Insulin System in Patients with Type 1 Diabetes: A Meta-analysis”

Xiaojuan Jiao¹, Yunfeng Shen¹∗

¹Department of Endocrinology and Metabolism, the Second Affiliated Hospital of Nanchang University, Nanchang, 330006, China

∗Correspondence should be addressed to Professor Yunfeng Shen, syf92@live.com

Received date: July 18, 2023, Accepted date: July 27, 2023


Copyright: © 2023 Jiao X, et al. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

Abstract

Our team’s previous meta-analysis aimed to evaluate the efficacy and safety of closed-loop insulin system (CLS) in non-pregnant individuals with type 1 diabetes mellitus (T1DM). In this study, we aim to discuss the broader application of CLS in a more diverse population and address the current challenges and future development directions. Through a comprehensive review of relevant literature, our findings indicate that CLS not only effectively lowers glucose levels in T1DM patients but also demonstrates greater effectiveness and safety when utilized in pregnant women with T1DM, patients with type 2 diabetes mellitus (T2DM), those undergoing hemodialysis, or individuals requiring surgery. Recent studies have also explored the impact of CLS therapy on quality of life, neurological function, and C-peptide levels. Nevertheless, despite these promising results, CLS still encounters challenges in clinical practice, such as technological maturity, cost-effectiveness, and personalized treatment approaches. Therefore, further research and development of CLS technology are imperative to facilitate its broader adoption among diverse populations and address the current obstacles to its implementation.

Keywords: Closed-loop insulin system, Type 1 diabetes mellitus, Type 2 diabetes mellitus

Commentary

Closed-loop insulin system (CLS) is a remarkable innovative technology that has brought new hope to diabetes patients. In a meta-analysis published by us in 2022, we evaluated non-pregnant type 1 diabetes patients (T1DM) with a study duration of ≥ 8 weeks, and significant results were achieved. The analysis included ten articles [1-10], covering 11 studies with 817 participants. Our research findings demonstrated a significant improvement in glycemic control with a long-term CLS treatment compared to conventional treatment methods. Specifically, the CLS increased the time spent within the target glucose range (3.9-10 mmol/L) by 2.5 hours, corresponding to an improvement of 10.32 percentage points. Additionally, there was a reduction of approximately 15.7 minutes per day in hypoglycemia time (<3.9 mmol/L), equivalent to a decrease of 1.09 percentage points. The time spent in hyperglycemia (>10 mmol/L) decreased by approximately 128 minutes per day, equivalent to a reduction of 8.89%. Glycated hemoglobin (HbA1c) levels decreased by 0.30%. Furthermore, our analysis indicated no significant difference in the risk of adverse events between the closed-loop system and conventional treatment methods [11]. Through a comprehensive review of relevant literature, this study aims to explore the broader application of CLS in a more diverse population and discuss the current challenges and future development directions.

In addition to non-pregnant individuals with T1DM, CLS delivery systems have also been evaluated in other diabetes patients. For adults with onset type 1 diabetes (ADAPT), the use of CLS has shown more significant benefits compared to multiple daily injections of insulin with sensor-augmented pump (SAP) therapy, supporting the broader adoption of CLS in T1DM with suboptimal glycemic control [12]. In pregnant women with T1DM, CLS can achieve better glycemic control and maintain stable glucose levels [13-15]. However, a 28-

In conclusion, the prospects for developing closed-loop insulin pumps are promising. Through continuous technological improvements and innovations and addressing relevant challenges, CLS will provide diabetes patients with more effective and convenient tools for glucose management, improving their quality of life and reducing the risk of complications.

Acknowledgments

This study was supported by the National Natural Science Foundation of China (Grant No. 82160170) and the National Key R&D Program of China Synthetic Biology Research (No. 2019YFA0904500).

Competing Interests

The authors declare that they have no competing interests.

References


