Study shows hybrid pumps work very well in type 1 diabetes

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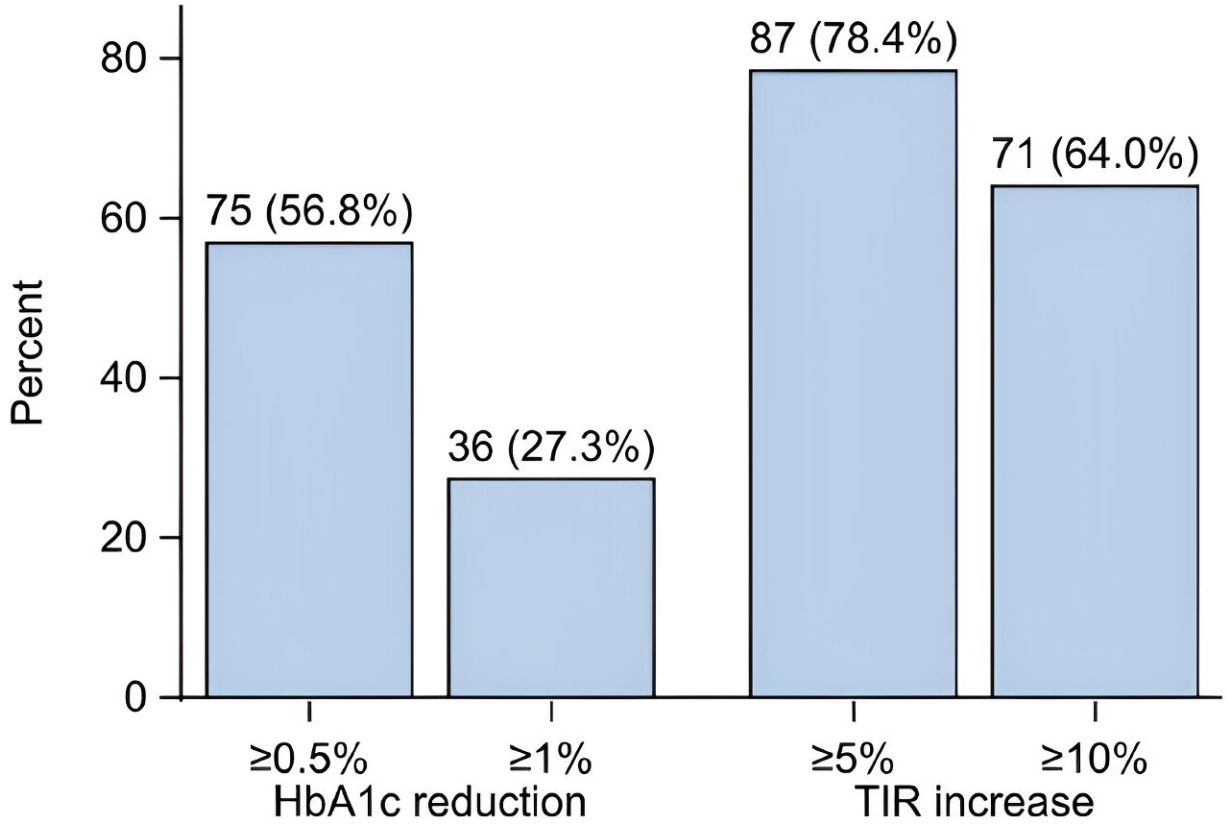

Proportion of persons with an improvement in HbA1c of 0.5% (5.5 mmol/mol) and 1% (11 mmol/mol) and time in range of 5% and 10%. Credit: *Journal of Diabetes Science and Technology* (2024). DOI: 10.1177/19322968241242386

Blood sugar levels improve when adults with type 1 diabetes use modern

insulin pumps. These are the findings of a study conducted at the University of Gothenburg. Patients are also overwhelmingly positive about the treatment.

New sophisticated insulin pumps constantly measure blood sugar levels and use specific algorithms to dose insulin and automatically keep blood sugar levels in check. The modern technology is called AHCL (Advanced Hybrid Closed Loop). The pump delivers insulin around the clock via a tube connected to a thin cannula in the subcutaneous fatty tissue. In Sweden, these pumps have been available for the treatment of type 1 diabetes in recent years.

Control of blood sugar

The study was conducted in collaboration with Sahlgrenska University Hospital Östra, and its results are published in the *Journal of Diabetes Science and Technology*. For the study, 142 randomly selected adults with type 1 diabetes were treated with one of two different AHCL pumps at six diabetes clinics in Sweden. The mean age of the study participants was 42 years old, and they had been using their AHCL pump for just over one and a half years on average.

Patients experienced a clear improvement in blood sugar when using the hybrid pump. The aim of insulin treatment is to keep blood sugar levels steady, between 3.9 and 10 mmol/L. On average, the time where patients had their blood sugar within this range increased by about three and a half hours per day.

Before the pump was inserted, the blood sugar of the patients was within this range for 57% of the time on average. With the hybrid pump, the average percentage of time with a target blood sugar increased to 71.5%.

Reduced risk of organ damage

Resident Physician Ramanjit Singh is affiliated with research at the University of Gothenburg and the lead author of the current study. "It is a significant improvement that patients on average increase their time within the target area by as much as three and a half hours.

"Guidelines consider that improvements of about 1 hour within the target area have an important role in reducing the risk of organ damage," says Ramanjit Singh.

The new treatment also reduced the time spent with excessively low blood sugar levels, from 0.7% to 0.3% of the time during the day. More severe blood sugar dips did not seem to be more common in patients on hybrid pump therapy.

The study also asked participants to indicate how satisfied they were with the advanced pump compared to their previous diabetes treatment. The results of the research survey were clear. On a scale from minus 18 (worst) to plus 18 (best), the average score was plus 14.8.

Side effects and safety

Although the treatment works well, the researchers behind the study note that there is potential for further development. As many as one in three patients had skin reactions to the adhesive used in the dressing of infusion sets or sensors.

Marcus Lind, Professor of Diabetology at Sahlgrenska Academy at the University of Gothenburg, leads the work at the diabetes research unit established at Sahlgrenska University Hospital Östra, where the research was conducted:

"We believe that blood sugar levels will further improve as more patients receive the new treatment. This will reduce organ damage and improve prognosis. Development of more tolerable products for the skin is important along with the treatment and further larger studies to assess the safety of the treatment are of value," says Marcus Lind.

The insulin pumps used in the study are called MiniMed 780 G and Tandem t:slim X2 with Control IQ. The study was an academic study carried out independently of the companies that are responsible for these pumps.

More information: Ramanjit Singh et al, Effects, Safety, and Treatment Experience of Advanced Hybrid Closed-Loop Systems in Clinical Practice Among Adults Living With Type 1 Diabetes, *Journal of Diabetes Science and Technology* (2024). DOI: 10.1177/19322968241242386

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