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Significant Improvement in Glycemic Control after Initiation of AHCL in Children with Type 1 Diabetes: A Single Center Prospective Study

ABSTRACT

Objective: This study aims to investigate the early impact of advanced hybrid closed loop system (AHCL) in achieving and maintaining treatment goals in children with T1D._

Materials and methods: A prospective longitudinal study was designed. Two separate analyzes were performed. The first one included the comparison of two systems in children with T1D who used to have Medtronic 640G system, then upgraded to the AHCL system, while the second analysis included the first 3 month-period analysis of glycemic parameters of children using AHCL, regardless their previous treatment before AHCL. Change in time in range (TIR) and a glucose management indicator (GMI) were compared at 3-month from baseline using t-test and Mann-Whitney U-test based on normality of the data.

Results: The cohort-1 included the children (n = 25, age: 10.5 ± 2.5 years) who were transitioned from Medtronic 640G to AHCL. TIR (3.8–10 mmol/L) increased from 75.5 ± 10% at baseline to 80 ± 6.2% at 3 months (p = 0.008). The cohort-2 included 33 children (age: 12.1 ± 3.2 years) and a total of 2970 patient-days were analyzed. The mean TIR (3.8–10 mmol/L), was 79.8 ± ± 8.1%. The mean GMI was 6.6 ± 0.3%. The frequency of participants who had a GMI < 7%, time below range (TBR < 3.8 mmol/L) < 4% were 84.8% and 100%, respectively. The fraction of those who achieved the 3 glycemic targets (GMI < 7% and TIR > 70% and TBR < 4%) was 81.8%.

Conclusions: This is the first study to report the positive impact of AHCL on the glycemic metrics of children with T1D from Turkey. Almost all children using AHCL have achieved glycemic targets and it is possible to achieve percentage of TIR which exceeds 80% with this system. (Clin Diabetol 2023; 12; 1: 45–52)

Keywords: children, type 1 diabetes, 780 g, advanced hybrid closed loop, time in range

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Introduction

The management of type 1 diabetes (T1D) through the course of a person's whole life and achieving the recommended glycemic targets while trying to maintain a happy life is a hard process with many challenges, especially so in childhood. Some people with T1D who have developed user-friendly technology to facilitate their management of T1D and from this have created a great support network, pretending that this process

is easy ("take insulin, watch your food intake, exercise, and you can manage diabetes well"). This contradicts the realities of life with diabetes. In fact, there are at least 42 factors which can have an effect on blood sugar levels and people with T1D have to make up to 300 decisions that will affect their glucose level every single day [1]. Continuous glucose monitoring (CGM) metrics including a mean glucose level of 100 mg/dL, a coefficient of variation (CV) of 16%, a time in range (TIR) of 98.9%, a time below range (TBR) of 1.1% and a time above range (TAR) of 0%, in children between 6 and 12 years without diabetes are very different from the current glucose metric targets for people with T1D [2, 3]. We know that after getting over the initial shock at the time of diagnosis, many caregivers will try to replicate the functions of their child's pancreas — they will continually monitor their glucose values and will go beyond the targets set by the diabetes teams to try their best to bring their children's glucose values closer to normal levels [4].

Recent studies show that a "high HbA1c" in people with T1D continues to be a problem in many countries, especially in people with T1D below 18 years of age. This is despite recommendations to lower metabolic control targets, for example, having an HbA1c target below 7% [5, 6]. Many reasons underlie this failure, including residual beta cell dysfunction, burn-out of the patient's family, managing difficulties, unequal access to technology, and therapeutic inertia [6]. Therapeutic inertia is an attitude seen not only in diabetes teams, but also in people with diabetes. This inertia leads to a type of diabetes management that follows fixed behavioral patterns rather than a dynamic response [7].

The most important obstacle to tightening the treatment targets is the fear of hypoglycemia, especially at night. As 50% of severe hypoglycemia attacks in children and adolescents occur during the sleep period, fear of night hypoglycemia is a common problem among people with T1D and their families [8, 9]. This fear often leads to patients going to bed with a high glucose level (> 180 mg/dL), parents repeatedly measuring blood glucose levels throughout the whole night, insomnia, and "diabetes care fatigue" in the early period. Today, the main direction of diabetes technologies is to reduce the burden of daily diabetes care routines and to make decisions through algorithms based on CGM data [9]. Initially, this process meant insulin suspension with low glucose levels, and moved on to suspension before a predicted low glucose level. This then progressed to automated insulin delivery (AID) systems, and finally, the advanced hybrid closed loop system (AHCL) with automated correction boluses. The AHCL-MiniMed™ 780G system, with its automatic basal, automatic correction, and safe meal bolus features, is a good option for overcoming the above-mentioned problems. The first published data shows that it helps to minimize hypoglycemia and to achieve glycemic targets, especially TIR [10].

Despite the recent improvements in diabetes care in Turkey (including an increase in the number of pediatric diabetes teams), the improvement of diabetes education, and the spread of treatment options parallel with current recommendations, 70% of people with T1D younger than 18 have a mean HbA1c of above 7.5%. Moreover, around 36% of them have a mean HbA1c level of above 9% [11]. Another consideration is that, in Turkey, insulin pumps are only partially reimbursed by the public insurance system, while CGM systems are not reimbursed at all. Therefore, socio-economic inequalities, like in many other countries, are directly reflected in diabetes control, and it is only those people with a high income that can access new technologies rather than those who need it most [12–14].

The AHCL-MiniMed™ 780G system has been used in Turkey since January 2021, and in this study, its impact on the achievement and maintenance of treatment goals, its effects on the frequency of hypoglycemia, and the parameters affecting the percentage of TIR were evaluated.

Materials and methods

A prospective longitudinal study was designed in which two separate analyses were carried out. The first analysis involved a comparison of two systems in children with T1D who used to use the Minimed™-640G system and then upgraded to the AHCL-Minimed™ 780G system. The second analysis investigated the first 3 month-period data for glycemic parameters of children using AHCL, regardless of their previous treatment before AHCL.

Three training sessions of 4–6 hours including technical training, an update on carb counting, exercise management and mental support, were carried out. The operating mode was switched to auto-mode after 48–72 hours of manual-mode for the system initialization. The algorithm glucose target was set to 100 mg/dL for all the children, the auto-correction was activated, and the duration of active insulin was programmed for 2 hours. The carbohydrate to insulin ratios (C:I) were reduced by 20% and the transition was performed with more "aggressive" C:I ratios. The participants were instructed to use a temporal glucose target of 150 mg/dL when the risk of hypoglycemia was high, for instance during exercise, and to increase their bolus doses by 20–30% if they had fat and protein rich meals [15].

The sensor and pump data were downloaded using the Carelink System® software and baseline data

were downloaded from the sensor augmented pump-predictive low glucose suspend (SAP-PLGS) system and AHCL system. Subsequently, automatic downloads were obtained from participants in the 2nd week and then monthly for the first 3 months following the start of auto-mode, using a mobile phone linked to the pump. Phone contact with the whole team was readily available to all the participants and their caregivers and was proactively encouraged. A tele-health visit was held at the end of the 2nd week with every participant. Clinical follow-up visits were arranged according to routine practice and the participants were not required to visit the clinic in between these times. The reports were assessed based on the international CGMS consensus report (3). TIR 70–180 mg/dL, TBR < 70 mg/dL and TBR < 54 mg/dL, TAR > 180 mg/dL and TAR > 250 mg/dL, glycemic variation coefficient (CV), and glucose management indicator (GMI) were evaluated. In the SAP-PLGS system, the time in different glucose ranges was calculated from the sensor data recorded in the CSV file exported from the Carelink System® software. Changes in postprandial control were evaluated based on the difference between the pre-prandial sensor glucose before every meal and the post-prandial sensor glucose 2 hours after every meal.

The protocols were conducted according to the Declaration of Helsinki principles and were approved by the Institutional Research Ethics Committee (2021.400.IRB1.115). Informed consent to participate in the study was obtained from the caregivers and the children above 12 years of age. All analyses were conducted using SPSS version 26 (IBM SPSS Statistics for Windows, version 26.0. IBM Corp, Armonk, NY, USA). The frequencies and percentages represented the descriptive statistics for the categorical variables. For the continuous variables, mean SD values were used if the variables had a normal distribution and median values were used if the variables did not have a normal distribution. For categorical variables, the χ^2 test was used, and for continuous variables, the t-test was used when the data was normally distributed. The Kruskal-Wallis test was used for comparing three or more groups and the Mann-Whitney U-test was used for comparing two groups of continuous variables in the case of non-normal distribution. Correlation analyses were performed using the Pearson method. A p value < 0.05 was considered statistically significant.

Results

A total of 1241 children and adolescents with T1D were followed up in the pediatric diabetes clinic at Koç University Hospital between June 2016 and October 2021. At the time of the study, 235 of them (19%) were on Continuous Subcutaneous Insulin Infusion (CSII) therapy. From January 2021, the AHCL-Minimed™ 780G was administered to a total of 56 children with T1D aged between 6 and 19 years. The first analysis was the evaluation of the children (n = 25, 11 female) who had transitioned from the Minimed™-640G to AHCL system and for whom at least a 3 month-period of data was available (Cohort 1). All the participants under 640G system were using CGMS (Guardian 3 sensor) and the Predictive Low-Glucose Management feature was on. The mean age and the mean duration of diabetes of the participants in cohort 1 were 10.5 ± ± 2.5 and 5.4 ± 2.8 years, respectively. The mean total daily dose (TDD) was 36.8 ± 15.3 units with a rate of basal to TDD of 45.4 ± 8.7% at the time of transition. The mean carbohydrate intake was 159 ± 47 g/day. All the participants were using fast acting insulin in the pump. The demographic features and glycemic parameters are given in Table 1. Although the TDD showed no significant change (36.8 vs. 37.4 unit/day, p = 0.145), the basal to total insulin ratio decreased significantly from 45.4 to 38% (p = 0.001) at 3 months. TIR increased from 75.5 ± 10% at baseline to 80 ± 6.2% at 3 months (p = 0.008), while TAR > 180 mg/dL decreased from 17.9 ± 7.7% at baseline to 15 ± 4.8% at 3 months (p = 0.022). TAR > 250 mg/dL also decreased from 4.3 ± 3.8% at baseline to 2.2 ± 1.6% at 3 months (p = 0.006). No differences in time in hypoglycemia and CV were noted at 3 months. However, the reduction in GMI was also significant at 3 months (6.9 ± 0.5 vs. 6.5 ± 0.2, p = 0.04) (Tab.2). In regard to the rates of meeting the glycemic control goals, the frequency of children with T1D whose TIR > 70% significantly increased at 3 months (72.2% vs. 95.2%, p = 0.025). A significant decrease in the mean sensor glucose (156 ± 32 mg/dL at baseline vs. 135 ± 9 mg/dL, p = 0.002) was noted at 3 months. A 7.9% increase in TIR was detected from the first 2 weeks of use of the systems, going from 75.6% to 83.5%. The improvement in TIR was maintained at 1 month with a 7.1% increase and at 3 months with a 4.4% increase (Fig. 1). No severe hypoglycemia or diabetic ketoacidosis episodes occurred during the study.

The second analysis investigated the last 3 months of data of children who had been using the AHCL system for at least 3 months, regardless of their previous treatment. A total of 2970 patient-days attributed to 33 (16 female) children were analyzed in terms of glycemic parameters, and any factors which might have been correlated with TIR were assessed. The mean age of the 2nd cohort was 12.1 ± 3.2 years and the mean duration of diabetes was 6.1 ± 1.3 years. The mean

Table 1. Baseline Characteristics of Study Groups

	Children on 640G system (n = 25) Mean ± SD	Total group (n = 33) Mean ± SD
Age [years]	10.5 ± 2.5	12.1 ± 3.2
Sex [female %]	44	48
Duration of diabetes [years]	5.4 ± 2.8	6.1 ± 1.3
Prior therapy	640G	640G (n = 25)
MDI (n = 8)		
Total daily dose [U/kg/day]	0.92 ± 0.2	0.95 ± 0.2
TIR (70–180 mg/dL) [%]	75.5 ± 10	75.9 ± 10.3
Frequency of the participants		
with TIR > 70% [%]	72.2	75
TAR > 180 mg/dL [%]	17.9 ± 7.7	17.5 ± 7.8
TAR > 250 mg/dL [%]	4.3 ± 3.8	4.3 ± 3.8
TBR < 70 mg/dL [%]	1.8 (0.25–4.4)†	1.8 (0.25–4.4) †
TBR < 54 mg/dL [%]	0.33 (0–1.4) †	0.33 (0–1.4) †
Mean sensor glucose [mg/dL]	156 ± 32	159 ± 36
CV [%]	32.1 (21–47) †	31.3 (21–46)†
Frequency of the participants		
with CV < % 36 [%]	86.4	89
GMI [%]	6.9 ± 0.7	6.8 ± 0.6

†Median (minimum–maximum)
CHO — carbohydrate; CV — coefficient of variation; GMI — glucose management indicator; SD — standard deviation; TAR — time above range; TBR — time below range; TIR — time in range

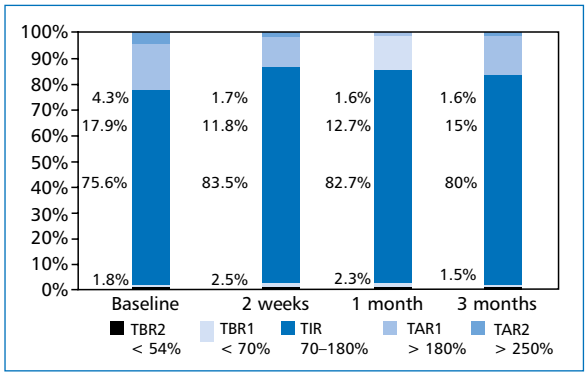

Figure 1. Time in Different Ranges by Period

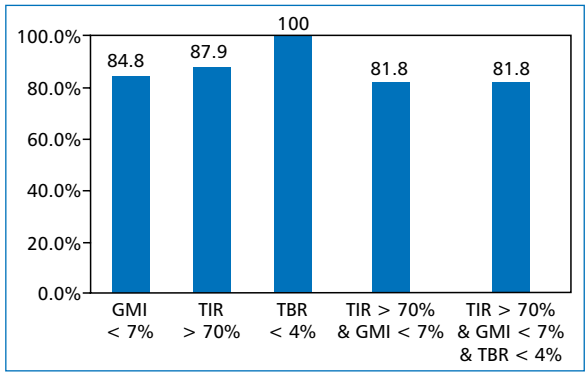

Figure 2. Percentage of Users Who Achieve Glycemic Targets

TIR, TAR and TBR were 79.8 ± 8.1%, 14.8% ± 5.9% and 1.9 ± 1.3%, respectively. The frequency of the participants whose TIR > 70% and TIR > 80% were 88% and 48%, respectively. The mean GMI was 6.6 ± ± 0.3%. The proportion of participants who had a GMI < 7% and TBR < 4% were 84.8% and 100%, respectively. The proportion of those who achieved the 3 glycemic targets (GMI < 7% and TIR > 70% and TBR < 4%) was 81.8% (Fig. 2).

The mean basal insulin ratio was 37.7 ± 6% while the ratio of auto-correction bolus was 24.3 ± 14.1%. The mean number of boluses was 5.7 ± 1.9 per day. The algorithm intervened with 35% of the meal boluses. The mean number of calibrations was 2.5 ± 0.6 per day, while the mean infusion set change period was 3.3 ± 0.7 days. The mean pre-prandial blood glucose levels before breakfast, lunch and dinner were 126 ± ± 17, 144 ± 19.8, 160 ± 21.6 mg/dL, respectively and pre-dinner glucose level was significantly higher than those at lunch and breakfast time ($p < 0.001$). The mean difference between pre-prandial and post--prandial sensor glucose levels were 22.1 ± 24.3, 9.3 ± 16.3, –4.6 ± 14.7 mg/dL for breakfast, lunch, and dinner respectively, and a significant difference

Table 2. Change in Glycemic Parameters and Insulin Requirement by 3 Months

	Baseline 640G System mean (min–max)	3 months 780G System mean (min–max)	Absolute difference (95% CI)	P-value
Total daily dose [U/kg/day]	0.92 ± 0.2(0.5–1.3)	0.92 ± 0.3 (0.4–1.5)	0.02 (–0.05 to 0.09)	0.276
Daily CHO intake [g/day]	159 ± 47 (60–238)	176.7 ± 48 (81–251)	17.7 (–18.2 to 120.2)	0.145
Basal insulin [%]	45.4 ± 8.7 (31–62)	38 ± 6.3 (28–52)	–7.4 (–17 to 6.4)	0.001*
Auto-correction insulin [%]	—	25.8 ± 9.7 (7–45)	—	—
Time in auto-mode [%]	—	97.5 ± 4.6 (79–100)	—	—
TIR (70–180 mg/dL) [%)]	75.5 ± 10 (53–91)	80 ± 6.2 (69–90)	4.5 (–15.6 to 31.4)	0.008*
Frequency of the participants with TIR > 70% [%]	72.2	95.2	—	0.025*
TAR > 180 mg/dL [%]	17.9 ± 7.7 (4.9–34.3)	15 ± 4.8 (7–25)	–2.9 (–18.4 to 10.9)	0.022*
TAR > 250 mg/dL [%]	4.3 ± 3.8 (0.1–11.9)	2.2 ±1.6 (0–6)	–2.1 (–13.6 to 6.04)	0.006*
TBR < 70 mg/dL [%]	1.8 ± 1.1 (0.25–4.4)	2.3 ± 1.5 (0–5)	0.5 (–1 to 0.26)	0.198
TBR < 54 mg/dL [%]	0.33 ± 0.4 (0-1.4)	0.4 ± 0.6 (0–2)	0.07 (–0.34 to 0.16)	0.695
Mean sensor glucose [mg/dL]	156.6 ± 34 (117–276)	136 ± 9 (123–161)	–20.6 (–34.5 to 9.07)	0.002*
CV [%]	32.1 ± 6 (21–47)	33.6 ± 4 (25.6–42.3)	0.01 (–0.07 to 0.09)	0.571
Frequency of the participants with CV < % 36 [%]	86.4	71.4	—	0.08
GMI [%]	6.9 ± 0.5 (6.1–7.9)	6.5 ± 0.2 (6.2–7.2)	–0.4 (–1.35 to 0.88)	0.043*

*p-value < 0.05 was considered statistically significant
CHO — carbohydrate; CV — coefficient of variation; GMI — glucose management indicator; SD — standard deviation; TAR — time above range; TBR — time below range; TIR — time in range

between them was also noted ($p < 0.001$). When the factors which are associated with TIR were analyzed it was noted that the number of calibrations per day and ratio of bolus/TDD were positively correlated with TIR (Pearson coefficient $r = 0.485$, $p = 0.04$, Pearson coefficient $r = 0.582$, $p < 0.001$) whereas TDD, ratio of basal insulin, and ratio of auto-correction were negatively correlated with TIR (Pearson coefficient $r = = –0.372$, $p = 0.033$, Pearson coefficient $r = –0.582$, $p < 0.001$, Pearson coefficient $r = –0.686$, $p < 0.001$). No significant correlation was detected between TIR and daily carbohydrate intake, infusion set change frequency and number of boluses (Pearson coefficient $r = 0.152$, $p = 0.39$, Pearson coefficient $r = –0.136$, $p = 0.44$, Pearson coefficient $r = 0.322$, $p = 0.06$).

The participants were grouped according to their TIR-group 1 (participants whose TIR percentage is below 70%), group 2 (participants whose TIR percentage is between 70 and 80%) and group 3 (participants whose TIR percentage is above 80%). The number of participants in the groups 1, 2 and 3 were 4, 13, and 16 respectively. The basal insulin ratio was highest in group 1 (46% in group 1 vs. 38%, 35% in groups 2 and 3 respectively, $p < 0.001$). The ratio of auto-correction bolus was highest in group 1, as well (46.5% in group 1 vs. 26.5%, 17.5% in groups 2 and 3 respectively, $p < 0.001$). Although the lowest number of daily boluses was noted in group 1 the difference was not significant (3.8 in group 1 vs. 5.8, 6.2 in groups 2 and 3 respectively, $p = 0.39$).

Discussion

The AHCL system has started a new era in diabetes treatment and has increased the expectations and motivation of people with T1D, their families and diabetes teams for better glycemic targets. The first two studies published after the introduction of the AHCL-MiniMed™ 780G system in Europe in January 2021 comprised data from adolescents and adults from economically developed countries using this system [10, 16]. These two studies showed that this system rapidly increased TIR with no increase in risk of hypoglycemia and enabled people with diabetes to achieve their glycemic targets [10, 16]. The present study involves only children and presents data from a country with relatively limited resources.

The 3-month data of the 25 cases who switched from the Minimed™-640G system to the AHCL system, showed that the mean TIR had increased from 75% to 80%, and the most significant difference was that the rate of participants whose TIR was above 70% increased from 72% to 95%. The mean GMI decreased from 6.9%

to 6.5%. It is noteworthy, however, that there was no reduction in CV. The explanation for this may be the fact that the participants already had desirable CV levels at the time of transition. It has since been observed that TIR has remained stable over time, and the problem of hypoglycemia has almost disappeared.

Our results show that although there was no significant change in the mean carbohydrate intakes and total daily insulin needs of the cases, the basal insulin rate decreased from 45% to 38%, which was statistically significant. Previously published pivotal studies focused on glycemic targets and did not share data on changes in insulin doses [17–19]. Alongside this, a recent study from Spain showed that although there was an increase in the total insulin dose in the early period, the basal insulin rate decreased from 44% to 41.8%, which was like our results [16].

In our study, the 3-month data (a total of 2970 patient days) of 33 children was analyzed in terms of glycemic targets and factors related to TIR. Our data showed that the mean TIR was 79.8%, and the frequency of the participants who had a TIR level above 70% and 80% were 88% and 48%, respectively. The mean sensor glucose level, TIR, TAR and TBR in our cohort were similar to the data reported from Spain [15] and seem to be better than the recently published first «Real-Word» data [10] and the results of certain pivotal studies [17–19]. The amount of participants who achieved the 3 glycemic targets (TIR > 70%, GMI < 7%, TBR < 4%) was 81.8% which indicates that the AHCL enables the majority of children with T1D to achieve the CGM metric goals. Providing a structured training program, making initial adjustments more aggressive, including an automated basal target of 100 mg/dL, an active insulin time of 2 hours and more aggressive C:I ratios may be recommended to meet these targets. This system significantly reduces the risk of hypoglycemia, relieves the fear of hypoglycemia, and consequently increases the potential of the children with T1D and their caregivers to reach 'time in range-centered diabetes care' [20].

AID systems generally make significant contributions to improving glycemic parameters. Current AID consensus recommends AID for most people with T1D [21]. In addition to the 780G system investigated in the current study, studies with the Omnipod 5 and Tandem Control IQ AID systems showed a 15% and 13% increase in TIR levels in children, respectively [22, 23]. Though these systems are not comparable, all AID systems help with better glycemic control. They increase TIR and decrease TAR without increasing the frequency of hypoglycemia [21].

Our data show that the mean ratio of basal insulin to TDD was below 40%, the algorithm interfered with the calculated meal bolus at a rate of 35.4% (associated with safe meal bolus), 24.3% of the total bolus was used for automatic corrections which suggests the importance of the correction doses. The pre-prandial glucose levels before dinner were relatively high which could be the effect of afternoon eating behaviors like snacking. The new and important contribution of this system is the autocorrection bolus algorithm. Our clinical observations show that the algorithm works well in general; however, the correction in meal boluses may cause an over-reduction in the meal bolus for breakfast and a need to enter fake carbohydrates for additional boluses to cover protein and fat rich meals. It might be noted that the algorithm needs some improvement with an option to send an additional bolus with no need to enter fake (empty) carbohydrates.

In the present study the correlation analyses showed that the number of calibrations per day and the ratio of bolus to TDD had a positive correlation with TIR, whereas TDD, ratio of basal insulin to TDD, rate of auto-correction bolus, and the rate of boluses suspended by algorithm had a negative correlation with TIR. Although the difference was statistically insignificant, the mean number of daily boluses was found to be 6.2 in the group with the highest TIR (> 80%) and higher than the other two groups (TIR < 70% and TIR: 70–80%). The optimal number of recommended daily boluses may be stated as 6; however, further analysis and studies with a larger sample size are required in this regard. High auto-correction rates suggest that the algorithm works hard to keep glucose in target range, and may be related to frequent eating and snacking, excessive and/or high protein-fat meals.

In addition to the positive impact of the AHCL system on glycemic goals, it also has indirect positive effects on the quality of life such as having a peaceful sleep and night, alongside the safety and trust which are provided by remote monitoring. These effects combined reduce the burden on families with diabetes [24]. Having a pre-prandial glucose level of around 100 mg/dL possibly prevents elevated post-prandial hyperglycemia and having adequate basal insulin in circulation continuously might have been preventing any hyperglycemia associated with glucagon secretion. High rates of TIR probably increase the sensitivity to insulin and consequently reduce insulin requirements. Since hypoglycemia is greatly reduced, the feeling of hunger and need for snacks also diminishes. However, extended research is needed to investigate these effects [25].

In our clinic, we provide a structured training program to every child with diabetes and their families who switch to the AHCL system, whether they are switching from multiple-dose insulin injection therapy or from an earlier model of pump. Structured training is of particular importance in the use of technology, and educational programs should not be compromised by families rushing to use the new systems as soon as possible [26]. However, we think that it is useful to keep the duration of the training program realistic and to concentrate the training mainly on the AHCL system as the probability of the system switching to manual mode is very low. Our observations based on the initial data demonstrate that, with some exceptions, 1 to 2 days of training is sufficient and there is no harm in switching to automatic mode after a minimum data collection period of 48 hours.

In order to maintain and go beyond the glycemic targets which were achieved with the AHCL, we think that focusing on human factors including careful carb counting, avoiding frequent snacking, bolusing 10–15 minutes before meals, changing insulin infusion sets at least every 3 days, and calibrations are essential. Strengthening the family education programs, complementing the "diabetes teams in the clinic'' with the "diabetes team at home" (the child with T1D and his/her caregivers or anyone involved in diabetes care) and maintenance of a close relationship/interaction with the families are of-great importance in this regard.

One of the main limitations of the present study is the low number of participants. However, Turkey is a country where the cost of diabetes technology is not reimbursed by public insurance and this situation restricts access to AHCL systems. The second limitation is the duration of system usage, which is relatively short. On the other hand, our study does present prospective, real-life data beginning with the initiation of auto mode, which can be considered as a strength of our study.

Conclusions

In conclusion almost all the children using the AHCL have achieved their glycemic targets and it is possible to achieve a percentage of TIR which exceeds 80% with this system. The percentage of TIR increases as the bolus percentage and the number of calibrations increases, while it is negatively correlated with the percentage of autocorrection boluses. Long-term studies are needed to determine if these positive effects are maintainable.

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Conflict of interest

None declared.

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