

Insulin Pump Characteristics in Type 1 Diabetes Patients with Optimal Glucose Control



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Background and Aim

Treatment goals of patients with Type 1 Diabetes (T1D) include achieving near-normal glucose levels with minimizing the risk of hypoglycemia and preventing or delaying diabetes complications. CSII therapy is becoming more popular treatment modality in young people with T1D.

Our Center uses modified protocol with 10 to 20% reduction of MDI, basal/bolus distribution 40/60, four to five basal rates and CIR and CF formulas as described (). We set glucose target range from 5.0 mmol/l to 7.2 mmol/l, with two CF (nighttime is usually 10-20% higher from the daytime).

The aim of the present study was to describe CSII characteristics in young T1D patients with optimal glucose control. We also aim to describe simple CSII settings as a tool, derived from our data, which could help clinicians to fine tune T1D patients and achieve optimal glucose control.

Demographic characteristics

Group	I	II
Age group, years	12-18	19-25
Age, years	13.8±2.1	21.6±2.4
N	43	50
Male	21	24
Female	22	26
BMI, kg/m ²	20.6±2.4	22.8±3.8
Diabetes duration, years	7.2±3.7	9.8±4.6
CSII duration, years	3.2±1.9	4.3±2.4
HbA1c at CSII, %	8.1±0.9	8.0±1.1

Materials and Methods

This single-center retrospective study was conducted by Center for insulin pump and sensor at University Clinic of Endocrinology in Skopje. The study enrolled patients with T1D using CSII, who attended our Center from January 2016 to December 2016.

Inclusion criteria were patients with T1D, age between 18 to 25 years, CSII treatment more than one year and at least three regular visits and obtained HbA1c in the last year.

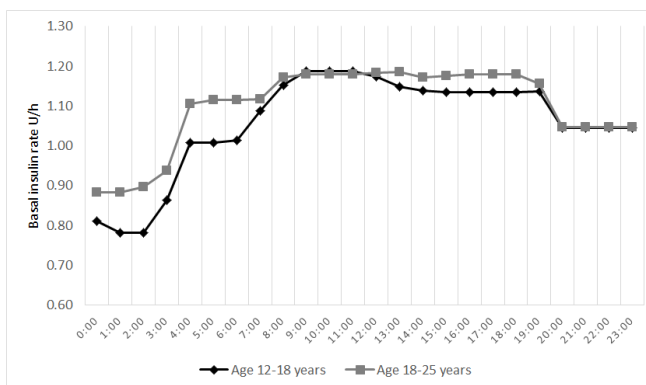
Following CSII characteristics were collected: TDD, carb intake, basal/bolus ratio, basal segments, bolus wizard use, CIR, CF, target range, active insulin time. These characteristics were obtained from 8-weeks CSII download report, generated prior to HbA1c, using Carelink Therapy Management Software (Medtronic, Northridge, USA). Patients were grouped according age: Group I (12-18 years) and Group II (19-25 years).

Simple and basic CSII settings as a tool was derived from our data with basal segments and its distribution, and bolus wizard settings.

Results

More than 70% of all patients achieved HbA1c levels less than 7.5%. A significant reduction of HbA1c levels by -0.8% and 0.9% was found in both groups, respectively ($P < 0.05$). There was no significant difference between groups.

24-hour basal insulin rates in T1D patients, by age groups 12-18 years and 19-25 years



Total insulin (U/kg/d) and basal insulin (U/kg/d) was significantly lower in age group 12-18 years, comparing with age group 18-25 years. Patients aged 12-18 years had five basal segments, less insulin early morning (03-07h) and slight decrease in afternoon basal segment (13-19h), comparing with patients aged 18-25 years with four basal segments, more insulin early morning (03-07h) and no decrease of afternoon basal segment (13-19h).

CSII parameters and possible settings

Group	I	II
Age group, years	12-18	19-25
Bolus setting		
CIR, gr	10 (8-12)	10 (8.5-10)
CF, mmol/l	2.50 (2.0-3.0)	2.1 (2.0-2.4)
Target Range, mmol/l	6.1 (5.6-7.4)	5.8 (5.6-6.8)
Number of basal segments	5	4
00h-24h, U/h	1.05	1.05
Segment 1 (00-03h), %*	75	80
Segment 2 (03-07h), %*	90	95
Segment 3 (07-13h), %*	110	110
Segment 4 (13-19h), %*	105	110
Segment 5 (19-24h), %*	100	100

* expressed in % of average basal segment (U/h)

Conclusions:

We showed that optimal glucose control is achievable in real life conditions among T1D patients on CSII therapy. Our results support that bolus wizard use, frequent bolusing, multiple basal segments and close follow up can be determinants for optimal control. Basic and simple CSII settings as a tool, derived from our data may help clinicians to fine tune T1D patients and achieve optimal glucose control.