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Mobile apps and challenges for type 1 diabetes control in children

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Introduction: The management of Type 1 Diabetes (T1D) in children needs innovative tools for effective glycemic control. Mobile applications for carbohydrate (CHO) counting may improve T1D management.

Objectives: The aim was to evaluate the efficacy of mobile apps for CHO counting in influencing glycemic control and related challenges among children with T1D.

Methods: A survey was run in 2022 to 2023 in Varna, Bulgaria. It collected demographic data, hypoglycemia events, and glycemic control measures from 76 caregivers of children with T1D. The children were categorized based on the use/non-use of mobile apps for CHO counting in 16 users and 60 non-users. Variables including age, BMI z-score, parental age, abnormal HbA1c, and hypoglycemia incidence were analyzed.

Results: The mobile app users had lower mean age of 132±50.5 months compared to 143±49.4 months of non-users, n.s. (t=0.848, p=0.399). There was no significant difference in BMI z-scores between users (0.407±1.12) and non-users (0.425±1.05; t=0.0573). A striking difference was observed in the incidence of elevated HbA1c - 37.5% in app users versus 75.0% in non-users (χ^2=8.05, p=0.005). App users didn't report problems with CHO counting compared to 26.7% in non-users (χ^2=6.29, p=0.043), although the former reported a higher incidence of everyday hypoglycemic episodes - 37.5% vs non-users (10.2%; χ^2=7.22), p=0.027.

Conclusions: The study suggests that mobile apps for CHO counting can significantly improve certain aspects of glycemic control in pediatric T1D patients. The lower prevalence of elevated glycated hemoglobin levels among app users indicates better overall control, despite a higher reported frequency of everyday hypoglycemia. The absence of carbohydrate counting difficulties in the app user group further supports the utility of these tools in T1D management. Further investigation is warranted to optimize app use and address the associated challenges, particularly the management of hypoglycemic events.

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Effect of nutrition education intervention on glycemic control and nutritional status in children with type 1 diabetes: a randomized controlled trial

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Introduction: Type 1 Diabetes Mellitus results from autoimmune destruction of insulin-producing beta cells, causing severe insulin deficiency. Insulin therapy is essential to prevent fatal hyperglycemic complications, while nutrition therapy plays a vital role in improving glycemic control.

Objectives: To access the effects of nutrition education on glycemic control and nutritional status among children with Type 1 Diabetes Mellitus

Methods: Participants aged 6-18 years, diagnosed for >1 year, were randomized into control (n=50) and intervention (n=50) groups via block randomization. CG participants received standard care, while IG participants underwent a carb counting intervention for 3 months. The intervention program comprised of 1 in-person session and 3 online sessions. Detailed history, anthropometric measurements, biochemical parameters, clinical examination, and 3-day 24-hour dietary intake data were collected at baseline, 3rd and 6th months. Data analysis included descriptive statistics and non-parametric tests. Ethical Clearance was obtained and study is registered in Clinical Trial Registry India (CTRI/2022/02/040696).

Results: Participants in the study included 30 boys and 70 girls with a mean age of 12.4±3.2 years. More than 50% of them hailed from rural areas. There was no significant difference between boys and girls concerning their level of education.

Table 1. Clinical Characteristics and laboratory values in the CG and IG at Baseline

Characteristics	CG n=50 Mean±SD	IG n=50 Mean±SD	t value	P value
Diabetes onset (Years)	7.6±4.0	7.0±3.7	-0.57	0.5699
Diabetes duration (Years)	5.6±3.2	5.3±3.2	-07	0.4856
Mean HbA1c%	11.5±2.5	10.6±2.9	-1.64	0.1042
Basal shot (units)	18.3±9.5	16.6±7.8	1.4743	0.1415
Bolus shot (units)	29.4±11.6	28.4±13.4	0.6130	0.5418
TC mg/dL	143.7±45.1	156.4±40.5	-1.48	0.142
HDL mg/dL	45.4±10.0	45.2±9.5	-0.1	0.920
LDL mg/dL	82.8±23.8	93.6±31.6	1.94	0.055
TG mg/dL	113.3±43.4	110.9±51.1	0.26	0.795

Table 2. Baseline characteristics of Participants

Parameter	Control Group (Girls-33, Boys-17) n=50		Intervention Group (Girls-37, Boys-13) n=50	
	Mean ± SD	Me(Q1-Q3)	Mean ± SD	Me(Q1-Q3)
Age (years)	**12.8±3**	**13(11-15)**	**12.1±3.4**	**12(10-16)**
Girls	13.1±3	14(12-15)	12.1±3.4	12(9.8-15.3)
Boys	11.6±2.8	11(10-14)	12.2±3.6	12(10-16)
Height (cm)	**142.4±16**	**149(133.5-156.6)**	**141±16.2**	**141(126.5-153)**
Girls	143.6±14.9	146(131-155)	140.8±15.6	145(126-153)
Boys	140±18.1	140(129-155)	141.3±18.5	140(128-147)
Weight (Kg)	**35.7±11.6**	**40.9(28.7-48.2)**	**35.5±12.9**	**32.3(25.9-43.5)**
Girls	37.9±11.9	44.7(38.4-51.5)	35.5±13	31(26-47)
Boys	31.5±10.1	31.7(23.9-38)	35.6±13.6	33(23-40)
BMI (Kg/m^2)	**17±3**	**16.5(15.4-16.5)**	**17.3±3.5**	**16.6(14.8-19.3)**
Girls	17.8 ±2.9	17(15.8-19.8)	17.3±3.8	16.4(14.7-19.4)
Boys	15.3±2.4	15.7(14.4-16.6)	17.2±2.6	16.9(15.2-19.2)

The average nutrient intake per 24-hour dietary recall, based on 3-day recall mean values of energy, carb, protein, and fat, showed similar distributions at baseline between the CG & IG.

Conclusions: Results indicate that the baseline characteristics of the study participants were adequately balanced between the CG & IG.

The preliminary results indicate that the intervention group has demonstrated improved glycemic control.

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Abstract Withdrawn

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A rare case of digenic MODY responsive to sulfonylurea treatment: coexistence of pathogenic variants in GCK and HNF1A

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Introduction: The clinical approach to MODYs varies depending on the type of disease. While GCK-MODY generally does not require treatment, HNF1A-MODY may present with more apparent symptoms and require treatment with oral anti-diabetics.

Objectives: Herein, we aimed to present the clinical findings and follow-up results of our adolescent patient diagnosed with digenic MODY.

Methods:

Results: A 16-year-old female patient was admitted to our clinic due to incidentally detected high blood glucose level.Her parents were healthy, and there was no consanguinity between them. F asting glucose, insulin and c-peptide levels were 109 mg/dl (6.1 mmol/L), 9.9 mU/L, and 2.5 ng/ml, respectively. HbA1c level was found as 7.6%. At the 120 th minute of oral glucose tolerance test, blood glucose level reached to 304 mg/dl (16.9 mmol/L) and insulin was measured as 39.2 mU/L. Oral metformin treatment was initiated. Also, a next generation sequencing (NGS) panel test was performed for searching MODY-related genes. During the follow-up, genetic results showed variants in GCK (c.37G>T) and HNF1A (c.955G>A), both of which were likely pathogenic. Metformin treatment was terminated and glibenclamide was started considering the diagnosis of HNF1A-MODY. In the initial period, metabolic control was achieved with a daily dose of 0.3 mg/kg. Since hypoglycemic events occurred during the follow-up, the treatment dose was gradually reduced to 0.1 mg/kg/day. In the last control of the patient, she was normoglycemic and HbA1c value was 6.7%.

Conclusions: Although single gene variants are mostly detected in MODYs, it should be kept in mind that there may be digenic variants and the clinical presentation may differ. The coexistence of GCK and HNF1A variants caused high levels of fasting and postprandial blood glucose levels and these patients may require treatment with sulfonylureas. Therefore, analysis with NGS instead of a target single gene search at the diagnosis of MODY will be beneficial in terms of treatment management, patient follow-up and prognosis.

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Comparative study of type 1 diabetes in children and adolescents of Spanish origin and Caucasian ethnicity and Moroccan origin and Maghrebi ethnicity

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Introduction: The etiology of type 1 diabetes (T1D) present unresolved questions, although we know that differences in disease incidence and progression are influenced by ethnic origin as well as environmental and economic factors characteristic of different geographic areas.

Objectives: The main objective of this study is to analyze the differences in childhood and juvenile T1D between the population of Moroccan nationality of Maghrebi origin (MM) and Spanish nationality of Caucasian origin (SC).

Methods: Descriptive observational retrospective cohort study with longitudinal sense of patients under 21 years old with T1D according to the criteria established by the ADA. In the comparative analysis between the two study groups and their clinical progression were included Spaniard Caucasians and Moroccan Maghrebis followed up in our clinics at the time of the study. Population data were collected from the municipal registry of inhabitants.