

ORIGINAL ARTICLE

School Performance Among a Sample of Type1 Diabetic Children and Adolescents in Erbil CityBAHAR MUSTAFA AZIZ¹, KARWAN HAWEZ SULAIMAN²¹M.B.Ch,B, F.I.B.M.S, family medicine, Erbil/Iraq²College of Medicine, Hawler Medical University, Erbil, Iraq

Corresponding author: Bahar Mustafa Aziz, Email: baharaziz89@gmail.com

ABSTRACT

Background: Type 1 diabetes mellitus (T1DM) is the most common endocrine disorder in children. The glycated haemoglobin (HbA1C) level was found to be correlated with the academic skills and classroom attention in children with T1DM. Left untreated both high and low blood sugar levels can affect the child's ability to concentrate on schoolwork and participate in school activities.

Methodology: In Laila Qasim diabetic center from June to August 2022, a questionnaire survey was used for this cross-sectional study. The sample included 120 diabetic children for case group. All primary and secondary school pupils with type 1 diabetes were included in the study population.

Result: In the present study, the correlation between diabetes and poor performance is clear in mathematics, english and science. The highest rate of fair followed not pass was found in uncontrolled HbA1c level (greater than 7) in all subjects except kurdish and found that students with type 1 diabetes had significantly lower overall academic grades than their nondiabetic classmates.

Conclusion: Diabetes is associated with reduced neuronal function, which ultimately results in cognitive impairment in areas such as intelligence, learning, memory, information processing, attention, executive function, visual motor integration, and academic performances.

Keywords: Type 1 diabetes mellitus; Children and adolescents; Academic performance; School

INTRODUCTION

In family medicine, diabetes mellitus is the most prevalent endocrine condition. An abnormal glucose metabolism accompanied by abnormalities in insulin secretion, insulin action, or both characterizes the group of metabolic illnesses known as diabetes (1). Type 1 Diabetes Mellitus (T1DM), which is brought on by an autoimmune reaction in which the body's defense system assaults the cells that create insulin, as a result the body produce very little or no insulin in children and adolescent (2), but type 2 diabetes mellitus (T₂DM) is the major type of diabetes around the world. 6% of people have diabetes mellitus, according to statistics. Approximately 90% to 95% of people with diabetes have type 2 diabetes (1). It is caused by the body's ineffective use of insulin added to a slow progressive loss of pancreatic β -cells (3). Both types of diabetes may have the same symptoms, but in T2DM they are often less marked or absent. Subsequently, it may be a silent disease without manifestation for a long time, until complications occur. For many years, this type of diabetes was observed only in adults, but, based on recent World Health Organization (WHO) data, it is also increasingly manifesting in children (4).

The American Diabetic Association states that T1DM is diagnosed when a child or adolescent has a fasting blood glucose level of ≥ 126 mg/dL (7.0 mmol/L), a 2-hour plasma glucose level of ≥ 200 mg/dL (11.1 mmol/L), a HbA1C of $\geq 6.5\%$ (48 mmol/mol), or the presence of random blood glucose that is ≥ 200 mg/dL (11.1 mmol/L) (5, 6). The management of children with T1DM is difficult for their families, and it is considerably more difficult in the school environment, where such children spend a significant time of their day. Students with diabetes may find difficulty with glucose management in an unprepared school setting, increasing their risk of developing acute complications (7). Reduced attendance in school, diabetes-related cognitive deficiencies, hypoglycemia, hyperglycemia, and the psychosocial effect of chronic illness are all potential variables that could lead to a kid with diabetes performing worse in school than their peers (8, 9). However, the incidence of hyperglycaemia in childhood diabetes has been shown to have grown over the past decade (10). A significant issue in the treatment of children with diabetes is lowering HbA1c while avoiding recurrent hypoglycemic episodes that could harm a child's growth and academic performance, especially impaired metabolic management also appears to be linked to impairments in learning capacity (11, 12).

Childhood with T1DM has been demonstrated to impair brain function in several ways and the brain is metabolically active organ may be affected by glucose instability(13). Chronic hyperglycemia, repeated severe hypoglycemia, and ketoacidosis have all been demonstrated to affect the brain and have an effect on academic outcomes (14). Moreover, T1DM has an impact on practically every aspect of a diabetic child's life, including their cognitive and academic ability. According to several studies, T1DM is linked to decreased neuronal function, which eventually results in cognitive impairment in domains like intelligence, learning, memory, information processing, attention, executive function, visual-motor integration, and academic achievement (6, 15, 16). According to teacher evaluations and school records in the United States that looked into educational issues in T1DM children discovered that they had lower academic competence ratings, a tendency to pay less attention in class, and more missing school days than their healthy siblings (14, 17, 18). Furthermore, (17) in Sudan revealed that, T1DM is the most common endocrine disorder in children. The glycated haemoglobin (HbA1C) level was discovered to be correlated with the academic skills and attention of classroom. This study aims to find the effect of type 1 diabetes on academic performance among a sample of children and adolescents

Aim of the study: To know the school performance in type I diabetic children and adolescence.

Objectives of the study:

- 1- To find out the effect of type 1 diabetes on school attendance, frequent absences, child's success in school, chronic absenteeism, and any developmental and learning delay.
- 2- To find out the association of school performance with the sociodemographic characteristics of the participants.
- 3- To find out the association between school performance and glycemic control (HbA1c) and other issues related to type I diabetes mellitus in children and adolescence.

Rational of the study: Since type I diabetes is chronic debilitating disease in children and adolescence and affecting their life style including their school performance and up to the researcher knowledge, no study done on Kurdistan region, we conducted this study on the effect of type I DM on school performance.

PATIENTS AND METHOD

Study design: Cross sectional study.

Sample size: A convenient sample of 120 diabetic children for case group. The study population included all primary and secondary school students who were T1DM.

Inclusion criteria: School-age (6-18years) children and adolescents with type1 diabetes attending the Laila Qasim Diabetic Centre.

Exclusion criteria:

- 1 Those with type 1 diabetes that have other comorbidities.
- 2 Those left school by any reason.

Study setting: The data collected from Laila Qasim diabetic centre in Erbil city.

The study duration: The study period from June to August 2022, which includes pilot study, data collection, results analysis and writing the final research.

Ethical consideration: All parents of participants informed about the purpose of the study and a verbal and a written consent taken from parents before participation. All the collected information will be kept confidential and will not be used for other purposes rather than this research.

Data collection: The data will be collected through direct interview with all parents using a structured questionnaire.

The Questionnaire: An appropriately designed questionnaire is prepared and constructed by the researcher after a thorough revision of already available and updated related data. The questionnaire includes the following parts:

Part one: is related to the socio-demographic data of the participants including: age [child (6-11years) and adolescent (12-18years)] (19), gender, education level, residence, occupation of parent employed and parent's educational level.

Part two: is related to issues concerning diabetes and its management which include information about the onset of diabetes, duration of diabetes, nutrition, exercise training, self-

monitoring of blood glucose, management of hypoglycaemia and hyperglycaemia, administration of drugs by themselves or by assistant relatives and insulin doses which measure by international unite and management of T1DM in patients with additional disorders. HbA1c was determined at each clinic visit by agglutination inhibition immunoassay.

Part three: is related to school performance information: Information from the school and poor school performance considered as absence from school (> 9 days) or had school failure and skipping from school (for the rest of the year). Marking systems in school are not comparable, since the numerical school grades were compared and standardized using national standard achievement tests in mathematics, English, Science and Kurdish, whereas the alphabetical grades are criterion referenced, with each pupil leaving compulsory education expected to fulfill a criterion for the lowest level.

Data Processing and Analysis: The collected data were exported to the prism (graph pad (6.1)) for analysis by using appropriated statistical methods which is Chi-squared test. A P-value of less than 0.05 was considered statistically significant.

RESULT

Table 1 summarizes the sociodemographic characteristics of the studied population. A total of 120 patients (42 child and 78 adolescents) with T1DM participated in the study. About two thirds (65%) of the children were females. More than half of the families (68.33%) live in urban. Basic school constitutes the highest percentage of household head educational level. Regarding the socioeconomic status (SE) of the studied population highest percentage 40.83% were middle SE followed by low 37.50%.

Table 1: Sociodemographic characteristics of children and adolescent with Type 1DM attending Diabetic centre

Variables	Response Category	Frequency (n=120)	Percentage (%)	Child	Percentage (%)	Adolescents	Percentage (%)	P value
Gender	Male	42	35	15	12.50	27	22.50	>0.9999
	Female	78	65	27	22.50	51	42.50	
Residency	Rural	38	31.67	15	12.50	23	19.17	0.4843
	Urban	82	68.33	27	22.50	55	45.83	
Household head	Father	83	69.17	27	22.50	56	46.67	0.0032
	Mother	17	14.17	12	10.00	5	4.17	
	Brother	8	6.67	2	1.67	6	5.00	
	Other	12	10	1	0.83	11	9.17	
Household head educational level	Illiterate	11	9.17	2	1.67	9	7.50	0.012
	Basic	36	30	19	15.83	17	14.17	
	Secondary	29	24.17	11	9.17	18	15.00	
	Diploma	17	14.17	1	0.83	16	13.33	
	Bachelor	27	22.50	9	7.50	18	15.00	
Socioeconomic state	High	26	21.67	2	1.67	24	20.00	0.0005
	Middle	49	40.83	16	13.33	33	27.50	
	Low	45	37.50	24	20.00	21	17.50	

Table 2: Issues concerning Diabetes and its management

Variables	Response Category	Frequency (n=120)	Percentage (%)	Child	Percentage (%)	adolescents	Percentage (%)	P Value
Time of Diagnosis	Before joining school	54	45	15	12.50	39	32.50	0.1335
	After joining school	66	55	27	22.50	39	32.50	
Duration of the illness	<5 years	42	35.00	12	10.00	30	25.00	0.0837
	5-10 years	63	52.50	21	17.50	42	35.00	
	>10 years	15	12.50	9	7.50	6	5.00	
Family history of diabetes	Yes	40	33.33	10	8.33	30	25.00	0.1547
	No	80	66.67	32	26.67	48	40.00	
Visiting doctors regularly	Yes	44	36.67	31	25.83	13	10.83	<0.0001
	No	76	63.33	11	9.17	65	54.17	
Glucometer device	Present	115	95.83	41	34.17	74	61.67	0.6563
	Absent	5	4.17	1	0.83	4	3.33	
Blood glucose monitoring	Regular monitoring	35	29.17	23	19.17	12	10.00	<0.0001

	Irregular monitoring	54	45.00	16	13.33	38	31.67	
	Not monitoring at all	31	25.83	3	2.50	28	23.33	
Insulin administration	By parent only	67	55.83	31	25.83	36	30.00	0.001
	By the child alone	24	20.00	1	0.83	23	19.17	
	By the child with adult supervision	29	24.17	10	8.33	19	15.83	
HbA1C level within the last 3 months	controlled <7	11	9.17	8	6.67	3	2.50	0.0157
	Uncontrolled >7	109	90.83	34	28.33	75	62.50	
Difficulties with treatment	High prices of medications	73	60.83	15	12.50	58	48.33	0.0002
	High prices of doctor visits	5	4.17	3	2.50	2	1.67	
	Unavailability of medications	42	35.00	24	20.00	18	15.00	
History of previous hospital admission	No	20	16.67	11	9.17	9	7.50	0.234
	DKA	71	59.17	22	18.33	49	40.83	
	Infection	12	10.00	4	3.33	8	6.67	
	Hypoglycemia	17	14.17	5	4.17	12	10.00	
Presence of complications	None	16	13.33	8	6.67	8	6.67	0.7471
	Hypoglycemia	17	14.17	5	4.17	12	10.00	
	DKA	71	59.17	23	19.17	48	40.00	
	Eye	10	8.33	3	2.50	7	5.83	
	Kidney	4	3.33	2	1.67	2	1.67	
	Diabetic neuropathy	2	1.67	1	0.83	1	0.83	
Diet choice	Special diet	43	35.83	5	4.17	38	31.67	<0.0001
	Normal diet	77	64.17	37	30.83	40	33.33	
Exercise	Regular	21	17.50	2	1.67	19	15.83	<0.0001
	Irregular	52	43.33	11	9.17	41	34.17	
	Not	47	39.17	29	24.17	18	15.00	

Table 3: School performance according to the success of Type 1 DM of Children and adolescents Attending Diabetic Center

Subject	Age groups	Diabetic (no.)	not pass	Percentage (%)	Fair	Percentage (%)	medium	Percentage (%)	Good	Percentage (%)	Very good	Percentage (%)	excellent	Percentage (%)	P value
Math	Child	42	19	15.83	10	8.33	3	2.50	5	4.17	2	1.67	3	2.50	0.0009
	Adolescents	78	8	6.67	23	19.17	16	13.33	12	10.00	10	8.33	9	7.50	
English	Child	42	4	3.33	7	5.83	9	7.50	9	7.50	7	5.83	6	5.00	0.0008
	Adolescents	78	18	15.00	27	22.50	22	18.33	4	3.33	3	2.50	4	3.33	
Kurdish	Child	42	4	3.33	8	6.67	12	10.00	7	5.83	6	5.00	5	4.17	0.8852
	Adolescents	78	12	10.00	19	15.83	18	15.00	10	8.33	11	9.17	8	6.67	
Science	Child	42	8	6.67	9	7.50	6	5.00	5	4.17	7	5.83	7	5.83	0.0363
	Adolescents	78	16	13.33	25	20.83	19	15.83	11	9.17	4	3.33	3	2.50	

Table 4: Association between School performances with HbA1C level

Subject	Degree	Diabetic (no.)	HbA1C level within the last 3 months				P Value
			controlled <7 (11)	Percentage (%)	Uncontrolled >7 (109)	Percentage (%)	
Math	not pass	27	0	0.00	27	22.50	0.0196
	Fair	33	1	0.83	32	26.67	
	Medium	19	4	3.33	15	12.50	
	Good	17	2	1.67	15	12.50	
	Very good	12	2	1.67	10	8.33	
	excellent	12	2	1.67	10	8.33	
English	not pass	22	0	0.00	22	18.33	<0.0001
	Fair	34	1	0.83	33	27.50	
	Medium	31	2	1.67	29	24.17	
	Good	13	2	1.67	11	9.17	
	Very good	10	2	1.67	8	6.67	
	excellent	10	4	3.33	6	5.00	
Kurdish	not pass	16	0	0.00	16	13.33	0.037
	Fair	27	1	0.83	26	21.67	
	Medium	30	3	2.50	27	22.50	
	Good	17	2	1.67	15	12.50	
	Very good	17	3	2.50	14	11.67	
	excellent	13	2	1.67	11	9.17	
Science	not pass	24	0	0.00	24	20.00	0.0003
	Fair	34	1	0.83	33	27.50	
	Medium	25	2	1.67	23	19.17	
	Good	16	2	1.67	14	11.67	
	Very good	11	3	2.50	8	6.67	
	excellent	10	3	2.50	7	5.83	

Table 5: Association between School performances with presence of complication

Subject	Degree	Diabetic (no.)	Presence of complications											Percentage (%)
			None (16)	Percentage (%)	Hypoglycemia (17)	Percentage (%)	DKA (71)	Percentage (%)	Eye (10)	Percentage (%)	Kidney (4)	Percentage (%)	Diabetic neuropathy (2)	

Math	not pass	27	2	1.67	6	5.00	15	12.50	2	1.67	1	0.83	1	0.83
	fair	33	2	1.67	8	6.67	20	16.67	2	1.67	1	0.83	0	0.00
	medium	19	3	2.50	2	1.67	12	10.00	1	0.83	1	0.83	0	0.00
	good	17	1	0.83	1	0.83	12	10.00	1	0.83	1	0.83	1	0.83
	Very good	12	4	3.33	0	0.00	6	5.00	2	1.67	0	0.00	0	0.00
	excellent	12	4	3.33	0	0.00	6	5.00	2	1.67	0	0.00	0	0.00
English	not pass	22	3	2.50	2	1.67	15	12.50	1	0.83	1	0.83	0	0.00
	fair	34	3	2.50	6	5.00	21	17.50	2	1.67	1	0.83	1	0.83
	medium	31	2	1.67	4	3.33	20	16.67	3	2.50	1	0.83	1	0.83
	good	13	4	3.33	3	2.50	3	2.50	3	2.50	0	0.00	0	0.00
	Very good	10	3	2.50	1	0.83	4	3.33	1	0.83	1	0.83	0	0.00
	excellent	10	1	0.83	1	0.83	8	6.67	0	0.00	0	0.00	0	0.00
Kurdish	not pass	16	3	2.50	3	2.50	7	5.83	2	1.67	0	0.00	1	0.83
	fair	27	2	1.67	5	4.17	14	11.67	4	3.33	2	1.67	0	0.00
	medium	30	3	2.50	4	3.33	18	15.00	2	1.67	2	1.67	1	0.83
	good	17	4	3.33	3	2.50	9	7.50	1	0.83	0	0.00	0	0.00
	Very good	17	3	2.50	1	0.83	12	10.00	1	0.83	0	0.00	0	0.00
	excellent	13	1	0.83	1	0.83	11	9.17	0	0.00	0	0.00	0	0.00
Science	not pass	24	1	0.83	4	3.33	14	11.67	3	2.50	1	0.83	1	0.83
	fair	34	5	4.17	2	1.67	24	20.00	3	2.50	0	0.00	0	0.00
	medium	25	3	2.50	3	2.50	16	13.33	2	1.67	0	0.00	1	0.83
	good	16	2	1.67	4	3.33	7	5.83	1	0.83	2	1.67	0	0.00
	Very good	11	2	1.67	3	2.50	4	3.33	1	0.83	1	0.83	0	0.00
	excellent	10	3	2.50	1	0.83	6	5.00	0	0.00	0	0.00	0	0.00

Table 6: School performance according to the absences and failure/skipping from school of Type 1 DM of Children and adolescents Attending Diabetic Center

Variation	Age groups				P value
	<9 days	9-18 days	19-30 days	>30 days	
Absence from school(days per year)	<9 days	19	15.83	62	51.67
	> 9 days	23	19.17	16	13.33
failure and skipping from school	Yes	12	10.00	8	6.67
	No	30	25.00	70	58.33

Table 2 revealed that most of the participant 55% was diagnosed with T1DM after joining their schools. More than half (52.5%) of the participants have the duration of illness of 5 to 10 years and two third of them have no family history of diabetes (66.67%). In general, majority of the participants (63.3%) were not visiting doctors regularly. On the other hand, there was a significant difference found between children and adolescence in visiting doctors regularly, presence of Glucometer device, parent insulin administration, uncontrolled HbA1C level within the last 3 months, and difficulties with treatment of high prices of medications. Furthermore, there were no significant difference were found in history of previous hospital admission and presence of complications. As well as, there were significant differences were revealed in choosing normal diet (64.17%) and exercise. Most of the patients (43.33%) had irregular exercise.

The effect of diabetes on school marks in different subjects, we chose to study mathematics, English, Kurdish and science and made separate analyses. Table 3 showed the distribution of the percentage for the four subjects. The correlation between diabetes and poor performance is clear in mathematics, English and science. In contrast, for Kurdish, there was no significant difference found in Kurdish mark, but little effect on the probability of getting a high mark.

Table 4 revealed that the degree of subjects decreased with increasing HbA1c level. The highest rate of fair followed by not pass was found in uncontrolled HbA1c level (greater than 7) in all subjects except Kurdish. There were statistically significant differences in HbA1c level in both the control and uncontrolled groups.

The present study evaluated overall grades based on examinations in several academic subjects, representing the combination of multiple complications, and found that students with type 1 diabetes had significantly lower overall academic grades than their nondiabetic classmates (table 5).

The results (Table 6) showed that child/ adolescents with absenteeism and failure/skipping in school. There was significant difference were found in child/ adolescents with absence of child/adolescent. The rate of failure /skipping from school in child and adolescent was (10%) and (6.67%), respectively.

DISCUSSION

The current study may help to improve understanding of how T1DM affects schoolchildren's academic performance in Erbil. The proportion of female was slightly more than male, which agreed with two studies done in Australia and Japan (20, 21). The lifetime risk of developing T1DM is increased in close relatives of a patient with T1DM (6). A study showed that boys with diabetes performing significantly lower on measures of attention and learning than girls with diabetes (22). On the other hand, the result disagreed with a study done by Glaab et.al which showed that, the highest rate was seen in male (46 cases) as compared with female (32 cases) in T1DM (23). A lower physical activity among girls in comparison to boys can be explained according to our culture by weaker utilization of this activity due to the poor support given from school and parents with little encouragement to girls to participate in community sports. Furthermore, more than half of the families (68.33%) live in urban. The result agreed with (24) which reported that, the highest rate of patients with T1DM lives in urban which was 83% and the lowest rate was found in rural area (13%). Household head educational level was basic school for the majority. Socioeconomic state in our study was middle 49 (40.83%) followed by low 45(37.50%). It is found that there is no association between T1DM with both residence and the economic state that is because in Iraq even a child who comes from low income households or rural region he/she is able to access the recommended treatment by receiving it from the official primary health centers. The result agreed with (24) which found that there is no association between T1DM with both residence and the economic state that is because in Iraq even a child who comes from low income households or rural region, he/she is able to access the recommended treatment by receiving it from the official primary health centres (13).

Most (55%) of the children in the current study were diagnosed with T1DM after joining their schools and the duration of illness were 5-10 years (52.5%). The result agreed with (24) which explained that, the onset of disease in 92% was late after 5 year of age and 8% has early onset before 5 year of age. But the result disagreed with (6) which revealed that, the distribution of the diabetics according to duration (<3 year) was found. Our study revealed that, two third of the patients has no family history of diabetes (66.67%). The result agreed with (25) which revealed that,

around 33.3% of diabetics had family history of T1DM (aunts and uncles were included).

In the present study, the subjects had very good performance in self-monitoring of blood glucose. However, consultation with normal nutrition experts was necessary in 30.83% of children and 33.33% of adolescents. The result agreed with (26) which revealed that consultation is the key to nutritional care in patients with T1DM. (27) Asserted that education plays a significant role in enhancing knowledge, modifying attitudes, and improving performance in diabetic patients in terms of appropriate nutritional behaviour. Therefore, nutrition education along with insulin therapy is an important factor in controlling T1DM. Patients with T1DM may need insulin injections in case the disease was not controlled with an oral medication (28). Nevertheless, pharmacological treatment should always be combined with lifestyle modifications. It should be noted that dual/ combination therapies either oral or injectable are largely superior to monotherapy (29). Studies conducted by (30, 31) have shown an association of physical activity and exercise training with adequate long-term blood glucose control, particularly with decreased levels of glycosylated hemoglobin (HbA1C) and increased insulin sensitivity in patients with T1DM. (32) Reported that the fear of exercise-induced hypoglycemic attacks or radical drop in blood glucose account for diabetic adolescents disinterest in exercise training and sports. The same fear was witnessed in the present subjects. (33) Reported that only 50% of children with T1DM, who had controlled their blood glucose before exercise, had experienced hypoglycaemia more often than hyperglycemia incidents during exercise training (24).

The correlation between diabetes and poor performance is clear in mathematics, english and science, but little effect on the probability of getting a high mark because, diabetes has been shown to impair intelligence, memory, attention and understanding in children and adolescents (34, 35), as well as verbal intelligence quotient (36). These data are in accordance with the present finding, that students with diabetes showed significantly lower academic performance than nondiabetic controls (37, 38). In contrast to the findings of the present study, it has been reported that diabetes did not impair overall academic performance in children, and students with diabetes performed better than controls in both mathematics and reading (39). This may be explained by between-study differences in grade assessment methodology (class performance including reading versus written examinations, for example). A study of students with diabetes in Sweden found that academic performance (measured by mean examination scores) was slightly but significantly lower in children with diabetes, compared with controls (11).

The study showed that those with poor school performance had significance bad glycemic control. This finding is consistent with that of studies done (18, 34). This finding is due to fact that poor metabolic control leads to difficulty in intellectual ability (8).

The present study found that less than 30% of children and adolescents presented with DKA at diagnosis and this group of patients had a higher mean HbA1c compared to those who did not present with ketoacidosis. Nevertheless, there was no significant difference in the glycaemic control among the two groups (40). Also, children/adolescents presenting with DKA had elevated plasma glucose levels compared to the non-DKA group. Compared to reports from other African countries such as Nigeria (41) and Tanzania (42), this observed prevalence is low. It is difficult making comparisons with other studies given the wide scope of definitions used for diabetic ketoacidosis (43).

Most of the study population lived in a home with both biological parents. The finding that children with T1DM were absent from school approximately 9 days more than both their non-DM siblings and peers is particularly reassuring and is consistent with the finding of a study done by Mc.Carthy et.al who also obtained school absenteeism data using school report cards from 110 children with T1DM and their siblings (34). This provides additional evidence that children with T1DM are capable of not

only attending school regularly, but are also, along with their parents, effectively managing their condition medically and emotionally. Furthermore, it is possible that the discrepancy in the number of days missed between children with T1DM and control subjects is primarily due to appointments with health care professionals. Despite the fact that we were not able to determine the reason for each missed day, our multiple regression analysis did allow an examination of factors contributing to increased school nonattendance. Specifically, these included in decreasing order of significance, parental attitudes to school attendance, poorer metabolic control, shorter T1DM duration and externalizing behaviour (23). On the other hand, poor glycemic control was found to be correlated with school absenteeism. In line with these results, Cooper and colleagues found that school attendance in students with T1DM was 3% lower than their peers. In addition, they found that poor glycemic control was associated with poor school attendance (44). This could be attributed to the psychosocial disorders associated with poor glycemic control, or due to the effect of acute glycemic excursions in adolescents with poor glycemic control (43).

CONCLUSION

Children with T1DM in primary education showed lower marks. Patients who controlled their glycemic glucose less frequently had poorer school performance and subjects with lower marks than general population had poorer metabolic control. However, academic marks did not differ significantly between diabetic children. This study showed that T1DM influenced the academic performance of school children. The results indicated that the school performance of children with T1DM were associated with a higher rate of absence days in years.

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