

EFFECT OF METABOLIC CONTROL ON THE PRESENCE OF NONALCOHOLIC FATTY LIVER DISEASE (NAFLD) IN ADOLESCENTS WITH TYPE 2 DIABETES

JOSÉ A. OROZCO-MORALES¹, MARGARITA TORRES-TAMAYO², AIDA X. MEDINA-URRUTIA²
PILAR DIES-SUÁREZ¹ & PATRICIA G. MEDINA-BRAVO¹

1. Children's Hospital of Mexico Federico Gómez, Mexico City, Mexico
2. National Institute of Cardiology Ignacio Chávez, Mexico



INTRODUCTION

Type 2 diabetes (T2D) is an emerging disease in the pediatric population. The association between T2D and non-alcoholic fatty liver disease (NAFLD) has been described; the mechanisms responsible for the development and progression of NAFLD are incompletely understood.

Evidence of high Haemoglobin A1c (HbA1c) levels and the risk of diabetes complications has been demonstrated. Recent evidence suggests that metabolic control may have a role in the development and progression of NAFLD.

AIM

To evaluate the effect of metabolic control on the percentage of liver fat in T2D youths.

METHOD

This Cross-sectional study included a total of 47 adolescents with T2D, who attended the Diabetes Care Clinic of the Children's Hospital of Mexico Federico Gomez. The protocol was approved by the local Ethics and Research Committees.

The characteristics of the study were explained to all the participants; a complete clinical history, anthropometry and physical examination were performed.

To evaluate the average of liver fat, the imaging estimated proton density fat fraction (PDFF) was determined by magnetic resonance (MR). The HbA1c levels were analyzed by high performance liquid chromatography; we obtained an average of 12 HbA1c levels per patient (2years).

RESULTS

Mean age was 15.6 ± 1.75 years, and body mass index (BMI) was 25.1 ± 4.6 kg/m².

Considering the average PDFF threshold of 6.5% or higher, we had 31 adolescents with NAFLD and 16 without NAFLD. The HbA1c% average was higher in subjects with NAFLD (8.2 ± 2.2 vs $7.3 \pm 1.0\%$, $p < 0.05$).

We observed an association between the percentage of liver fat (PDFF%) and HbA1c% ($p < 0.001$). After a multivariable analysis, the association was non-significant when were adjusted for age, sex, BMI or Tanner score.

We observed the effect of HbA1c on the percentage of liver fat, and the association with the duration of T2D and the severity of NAFLD.

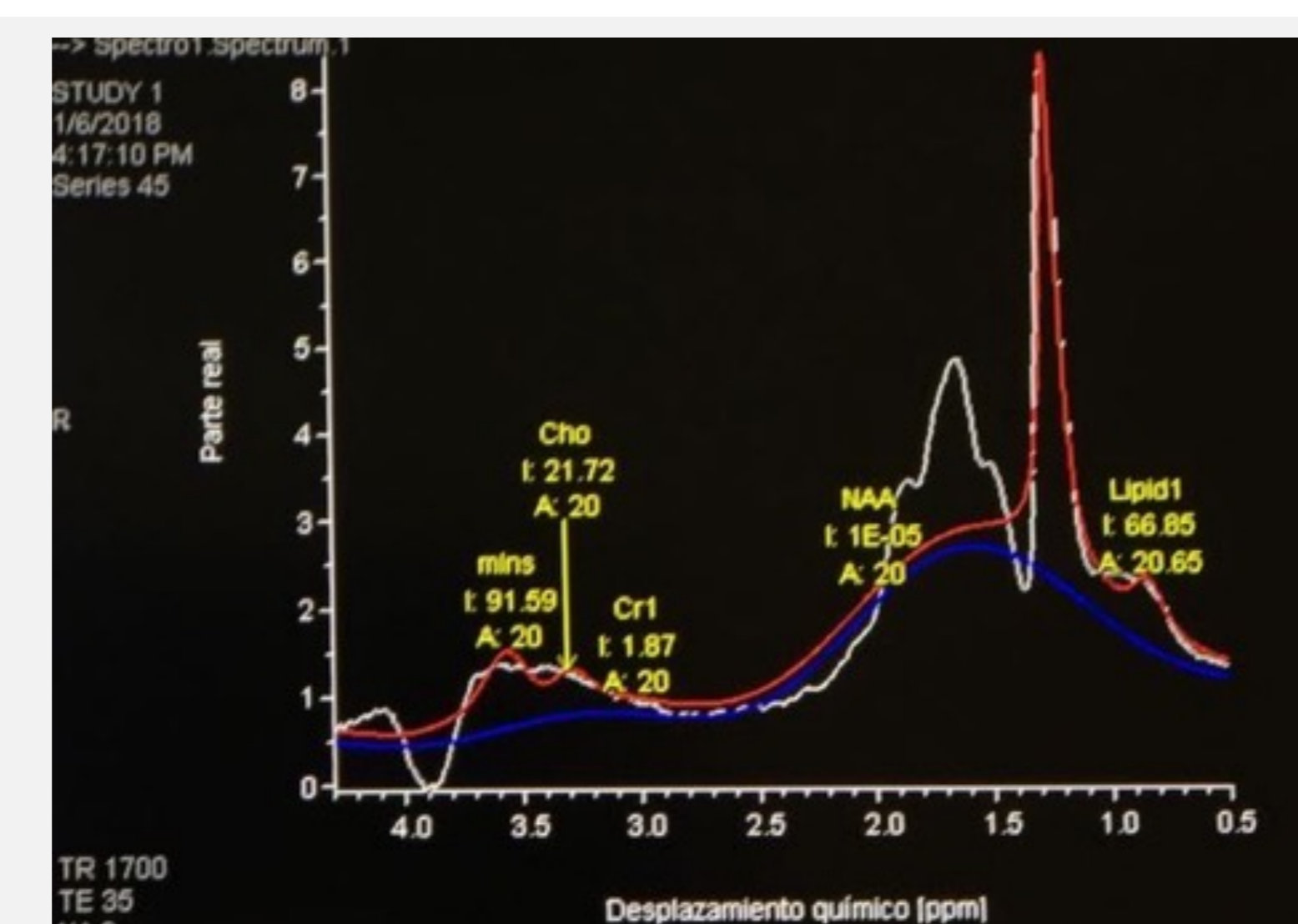
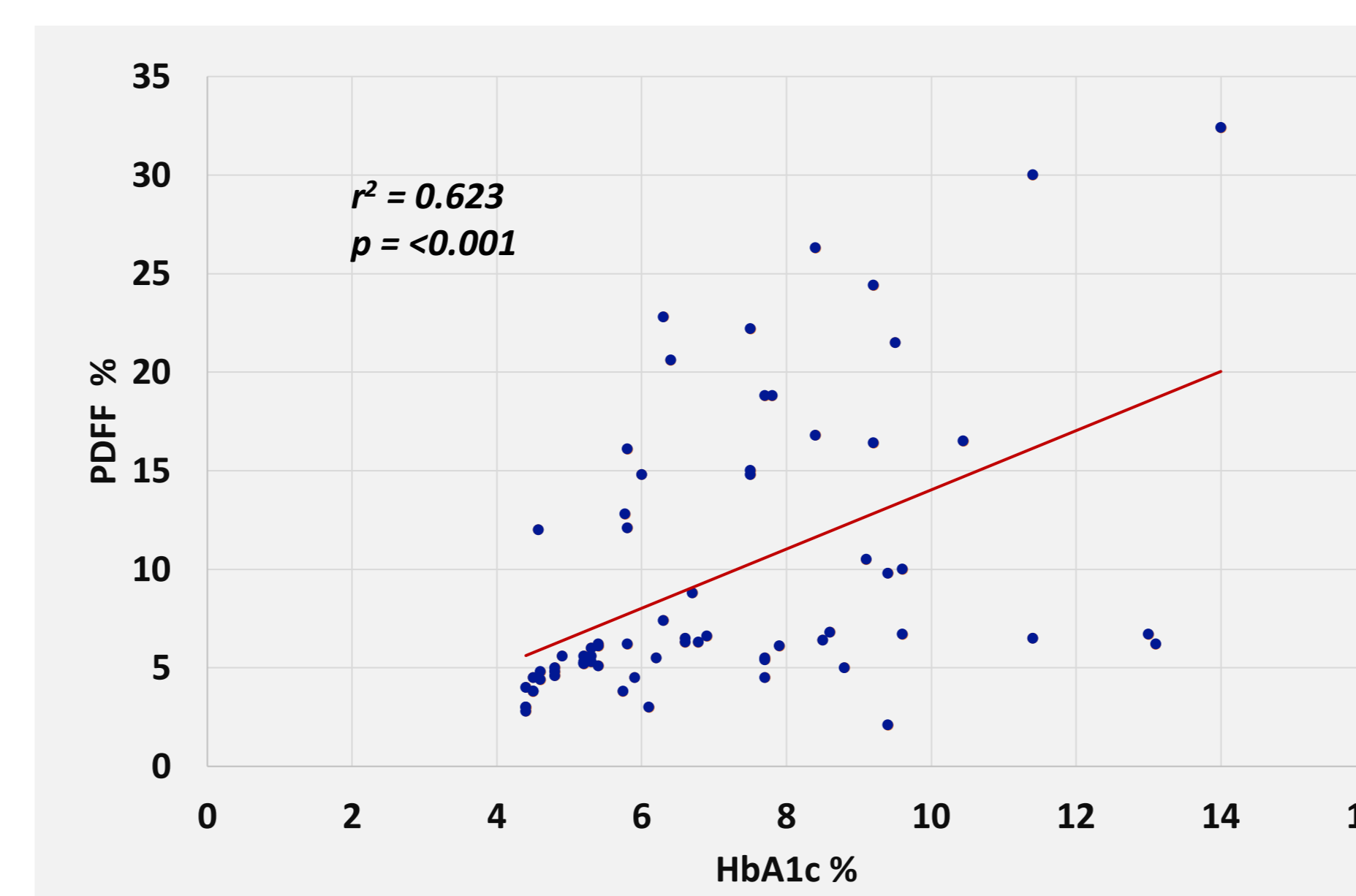
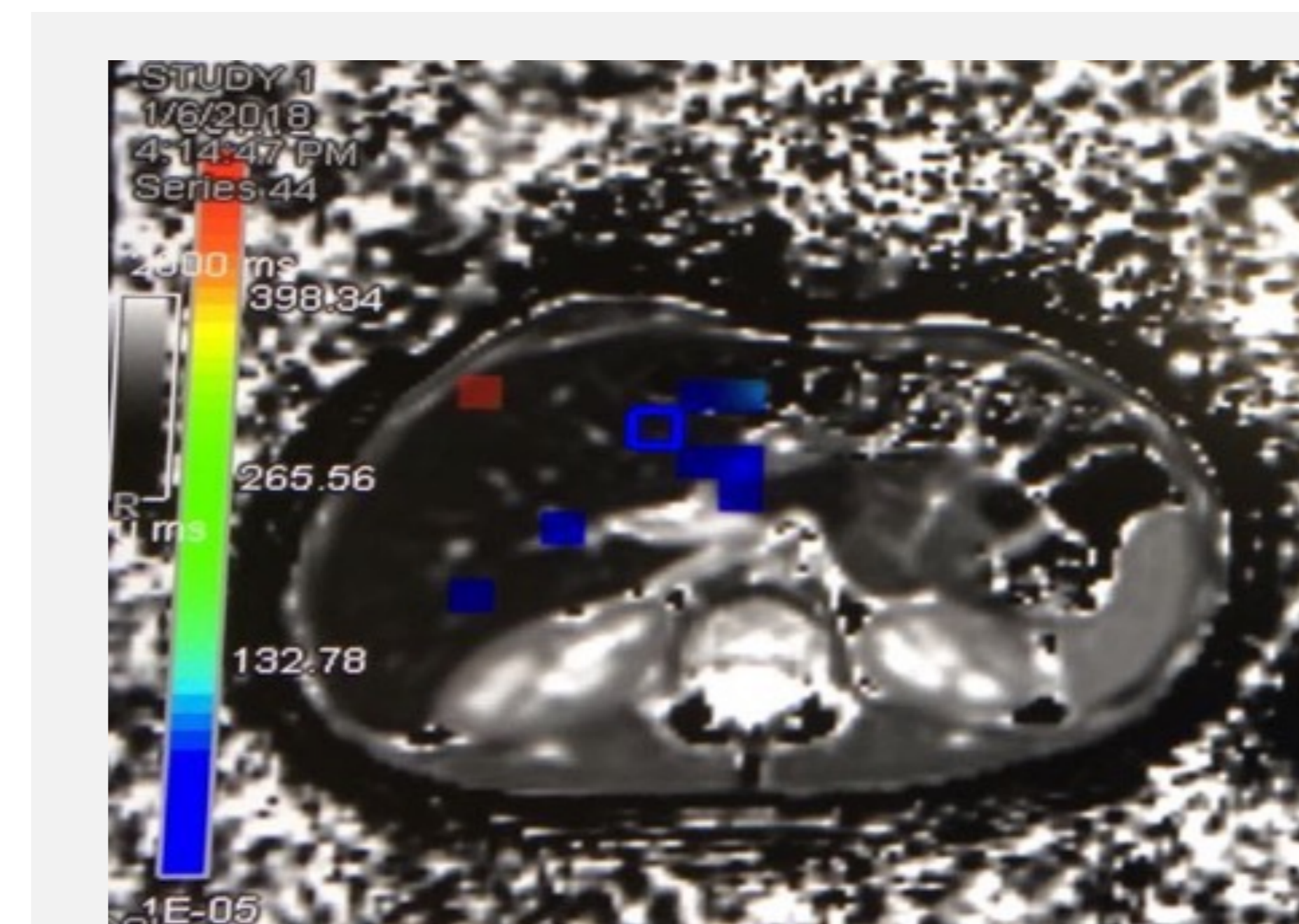


TABLE 1. Clinical and anthropometric characteristics in adolescents with T2D.

	T2D n = 16	T2D & NAFLD n = 31	p Value
Sex (M/F)	6 / 10	6 / 25	0.176
Age (years)	15.1 ± 1.8	15.9 ± 1.6	0.121
Weight (kg)	66.6 ± 15.3	64.6 ± 14.4	0.660
Height (m)	1.64 ± 0.12	1.58 ± 0.08	0.055
BMI (Kg/m ²)	24.1 ± 3.4	25.6 ± 5.0	0.375
BMI (score z)	1.1 (-1.2 - 2.1)	1.2 (-1.0 - 4.1)	0.115
Waist circumference (cm)	84.0 ± 10.5	86.6 ± 13.7	0.077
Waist/height ratio	0.48(0.40-0.61)	0.66(0.43-0.81)	0.075
SBP (mmHg)	102.5 ± 10.6	105.2 ± 9.0	0.370
DBP (mmHg)	65.5 ± 9.0	68.8 ± 7.3	0.190
Tanner 3-5 (%)	88.0	96.0	0.451
Duration of diabetes (months)	40.0 ± 24.1	54.6 ± 28.6	0.001*
Metformin treatment (%)	100	100	0.999
Insulin treatment (%)	64.8	66.7	0.892
Insulin dose (U/Kg/day)	0.42 ± 0.26	0.64 ± 0.25	0.028*

TABLE 2. Metabolic characteristics in adolescents with T2D.

	T2D n = 16	T2D & NAFLD n = 31	p Value
HbA1c average (%)	7.3 ± 1.0	8.2 ± 2.2	0.032*
Glucose (mg/dL)	190.0 ± 121.6	203.0 ± 97.0	0.394
Total Cholesterol (mg/dL)	168.7 ± 36.7	171.2 ± 45.5	0.779
Triglycerides (mg/dL)	139.6 (47-317)	189.5 (55-1041)	0.055
C-HDL (mg/dL)	43.3 ± 6.9	38.5 ± 9.1	0.038*
C-LDL (mg/dL)	103.0 ± 32.9	102.4 ± 26.9	0.719
ApoB (mg/dL)	99.3 ± 28.1	107.0 ± 32.2	0.472
ApoA (mg/dL)	136.0 ± 13.8	130.7 ± 19.4	0.059
Uric Acid (mg/dL)	5.5 (2.5-8.6)	4.3 (2.4-8.7)	0.059
Creatinine (mg/dL)	0.6 (0.4-1.0)	0.6 (0.4-0.8)	0.145
GOT (U/L)	19.7 (9.0-40.5)	24.3 (9.2-115.1)	0.055
GPT (U/L)	21.4 (7.1-73.3)	26.4 (3.8-143.4)	0.083
ALP (U/L)	139.6 (56.9-227.3)	132.0 (69.4-377.9)	0.281
GGT (U/L)	27.45 (7.0-84.5)	34.0 (8.7-177.7) ^β	0.094

CONCLUSIONS

In adolescents with T2D, high HbA1c levels are associated with increased of the percentage of liver fat (PDFF).

We observed the effect of metabolic control on the percentage of liver fat, and the relation with the duration of diabetes and the severity of NAFLD.

Further investigation is warranted to determine if the metabolic control of pediatric patients with T2D has a role in the development and progression of NAFLD.

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CONTACT INFORMATION

M.Sc., M.D. José Antonio Orozco Morales
Pediatric Endocrinologist
iosant_var@hotmail.com
PhD Student in Medical Sciences
Children's Hospital of Mexico

