

Endothelial and heart dysfunction in children and adolescents with type 1 diabetes.

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ESPE 2019
P1-185 --
DIABETES AND
INSULIN 2
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INTRODUCTION AND OBJECTIVES

- Type 1 diabetes (T1D) is an important risk factor for cardiovascular disease (CVD). Even if CVDs become mainly manifest in adulthood, the process of atherosclerosis starts in childhood
- Ultrasound is a reliable and noninvasive method for detecting early structural and functional atherosclerotic changes in the arterial wall and the heart

Aim of this study was to determine early ultrasound signs of atherosclerosis and of left ventricular (LV) systolic and diastolic dysfunction in children and adolescents with T1D.

PATIENTS AND METHODS

What?	Standard ultrasonic protocols ^{1,2} were used for assessments of: <ul style="list-style-type: none"> common carotid artery intima-media thickness (cIMT) LV systolic and diastolic function indices Ultrasound evaluation was performed by the same investigator blinded to subjects' anthropometric (height, weight, BMI, pubertal status, WC, SBP/DBP) and laboratory data (HbA1c, TC, LDL-C, HDL-C, TG)
Who?	<ul style="list-style-type: none"> Children and adolescents with T1D Inclusion criteria: age range ≥ 4 and < 18 years, regular 3-months follow up visit Exclusion criteria: other type of diabetes; the presence of chronic complications; documented heart diseases
When?	<ul style="list-style-type: none"> Patients were consecutively enrolled during a routine visit

RESULTS

Study population → 94 children and adolescents with T1D (males 59.6%)

Table 1 – Clinical and metabolic characteristics of study population.

Age (yrs)	12.3±3.53 (12.4)	T1D duration (yrs)	5.14±3.53 (4.03)
Height (SDS)	0.13±0.93 (0.04)	BMI (SDS)	0.09±0.87 (0)
WC (cm)	66.8±9.03 (65.5)	WC/Height ratio	0.44±0.04 (0.44)
SBP (mmHg)	114.8±15.5 (114)	DBP (mmHg)	64.47±9.17 (64.5)
Mean HbA1c last yr (%)	8.05±1.34 (7.95)	Mean HbA1c first 5 yrs (%)	7.88±1.09 (7.87)
TC (mg/dl)	165.9±30.7 (166)	LDL-C (mg/dl)	90.6±28.4 (87.0)
HDL-C (mg/dl)	63.1±12.5 (62.0)	TG (mg/dl)	62.9±31.0 (56.0)

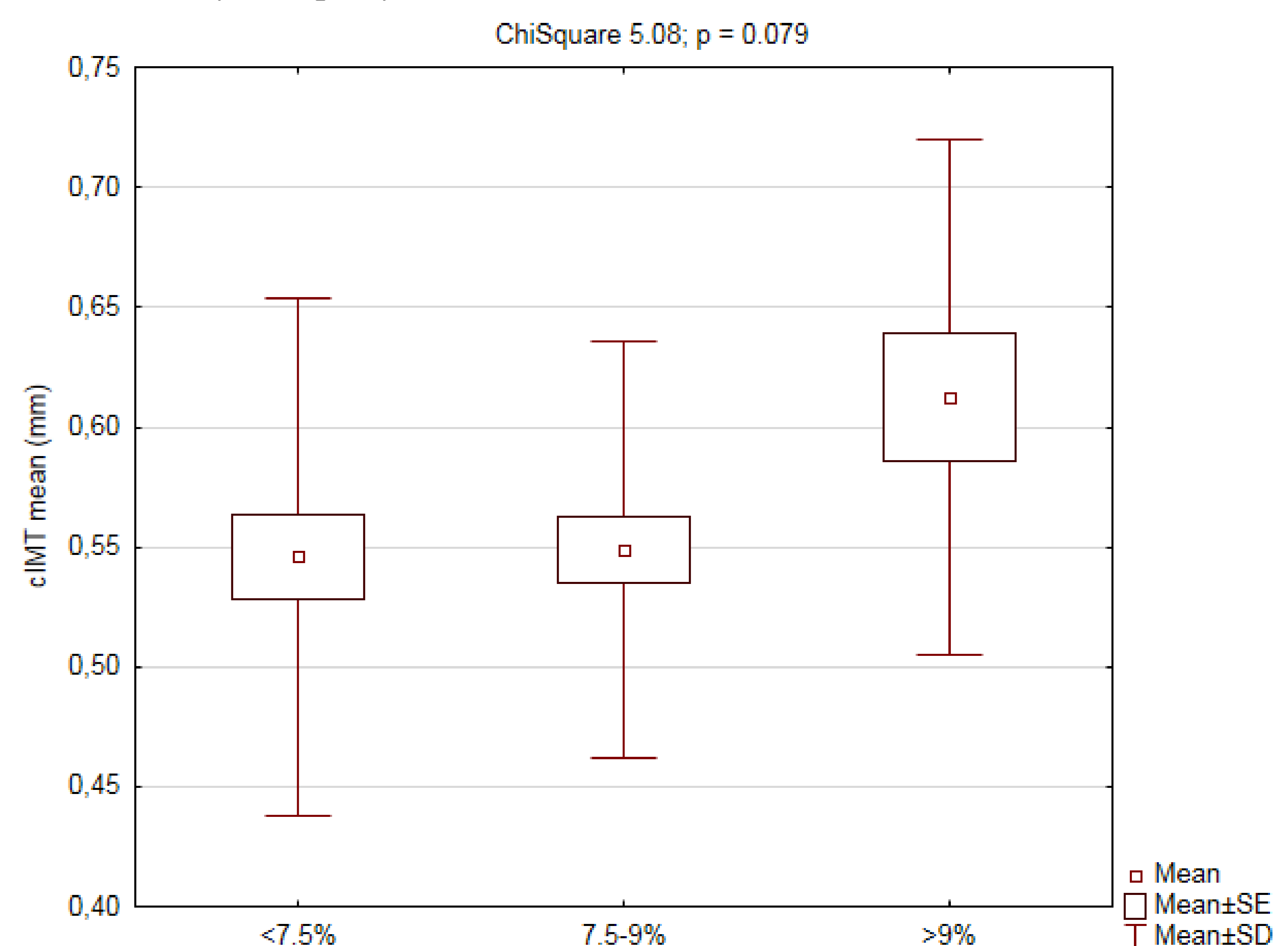
- Pubertal subjects vs pre-pubertal ones had significantly higher values of
 - cIMT 0.60±0.09 vs. 0.49±0.08 mm; p<0.001
 - interventricular septal end-diastole (IVSd) 7.27±1.27 vs. 6.61±1.00 mm; p=0.027
 - deceleration time (DT) 138.3±31.7 vs. 112.6±20.9 ms; p<0.001
 - IVRT 60.8±14.1 vs. 53.1±9.58 ms; p=0.006

- cIMT mean was significantly correlated with (Spearman R)

	R	p
Age (years)	0.51	<0.001
WC (cm)	0.39	<0.001
SBP (mmHg)	0.41	<0.001
Mean HbA1c first 5 yrs (%)	0.24	0.021
TG (mg/dl)	0.23	0.028
TG/HDL-C R	0.22	0.033

- The multivariate regression model was statistically significant for mean cIMT ($R^2=0.44$, p<0.001) and identify T1D duration ($\beta = -0.23$; p=0.024) and LDL-C levels ($\beta = 0.20$, p=0.031) as predictor factors.

- cIMT, LV systolic and diastolic function indices were all in the normal range defined for healthy population ^{2,3}
- According to mean HbA1c value in the last year, groups ($\leq 7.5\%$; 7.5-9%; $\geq 9\%$) were significantly different for
 - DBP Chi-Square=6.13; p=0.047
 - LV internal dimension at end-diastole (LVIDd) Chi-Square=7.25; p=0.027
 - A wave peak Chi-Square=6.11; p=0.047
 - isovolumetric relaxation time (IVRT) Chi-Square=7.29; p=0.026
 - cIMT (see Figure)



CONCLUSIONS

... cIMT was within the normal range, but it was higher in patients with a worse glycemic control ...

- In our study population, despite the good glycemic and lipid control, cIMT mean values were significantly higher respect to published ones in healthy ^{4,5} and T1D ^{5,6} children and adolescents. Moreover, LV diastolic function was slightly abnormal
- Ultrasound is useful for early detection of subjects with a greater cardiovascular risk who can benefit from targeted therapeutic interventions to prevent CVD

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