SMOKING AND METABOLIC PROFILE IN YOUTH WITH TYPE 1 DIABETES

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Aim of the study

The increased risk for cardiovascular disease (CVD) in T1D starts in childhood, and is influenced by a variety of interactions between environmental, genetic, and biological factors. Several studies have documented that smoking increases the risk of premature mortality and microvascular/macrovascular complications in adults with diabetes mellitus. In adolescents with type 1 diabetes (T1D), active tobacco smoking worsens glycemic control and is associated with a poorer cardiovascular risk profile.
Few prior studies have evaluated the relationship between active and passive smoking in juvenile type 1 diabetic subjects and metabolic parameters related to increased CV risk

Patients and methods

We recruited 104 consecutive male and female youths (50 females and 54 males) with T1DM (aged 16.4±8.6 years) from the Pediatric Diabetology Unit at Fondazione IRCCS Policlinico San Matteo. The patients were enrolled between September 01, 2017 and December 01, 2017.

The subjects according to their smoking habits were divided into three groups
- -active smokers group (AS): subjects smoking a single cigarette, even a puff in the past 30 days
- -passive smokers group (PS): subjects who lived with at least one smoker for at least one year prior to the study
- non-smokers group (NS): subjects who had never smoked.

The physical examination of the participants included nutritional status assessment by anthropometry and pubertal stage according to Marshall and Tanner as well as blood pressure (BP) measurement. In all patients, metabolic blood assays including fasting blood glucose, insulin, total cholesterol, high-density lipoprotein cholesterol, and triglycerides were measured. Insulin resistance was determined by glucose disposal rate (eGDR). Physical activity was also recorded (physically inactive =0–2 hours/week); physically active=3–8 hours/week).

Results

According to the smoking habits, 58 (55.77%) subjects were included in NS, 28 (26.92%) in PS and 18 (17.31%) in AS group. As detailed in table 1, PS group was younger than NS and AS groups (p<0.001) and NS group was younger than AS (p=0.008).

Auxological and pubertal stage were different inter groups according to age (p<0.001). Groups did not differ by gender (p=0.27), nor physical activity (PA) (p=0.63).

Clinical and metabolic features of the three groups are reported in table 1.

Table 1 Comparison of demographic, clinical and metabolic parameters among no smokers (NS), passive smokers (PS) and active smokers (AS)

Variable	NS (n = 58)	PS (n = 28)	AS (n = 18)	p overall	Post hoc comparison p-value (Bonferroni correction)		
					NS vs PS	NS vs AS	PS vs AS
Age (years)	17.36 ± 8.84	10.20 ± 4.28	22.90 ± 6.58	< 0.001	< 0.001	0.008	< 0.001
Sex (M/F)	32/26	11/17	11/7	0.27			
Weight (kg)	56.49 ± 20.90	39.25 ± 20.14	65.80 ± 10.49	< 0.001	0.001	0.02	< 0.001
Height (cm)	157.23 ± 20.83	140.51 ± 22.17	169.73 ± 7.93	< 0.001	0.018	< 0.001	< 0.001
BMI (kg/m^2)	21.90 ± 4.40	18.55 ± 4.03	22.72 ± 2.46	< 0.001	0.001	0.34	< 0.001
Waist circumference (cm)	71.84 ± 12.73	64.50 ± 13.79	79.47 ± 9.55	< 0.001	0.01	0.03	< 0.001
Tanner stages							
0 (Tanner stage 1)	11	13	0	< 0.001	< 0.001	0.02	< 0.001
1 (Tanner stage 2–3)	6	10	2				
2 (Tanner stage 4–5)	41	5	16				
Physically active (n, %)	32 (56.1%)	14 (50%)	8 (44.4%)	0.63			
Insulin dose (U/kg/die)	0.70 ± 0.27	0.65 ± 0.28	0.67 ± 0.19	0.75			
Glucose disposal rate (mg/kg/min)	10.17 ± 1.37	11.03 ± 1.58	9.43 ± 1.10	< 0.001	0.01	0.02	< 0.001
Glycated hemoglobin (%)	8.21 ± 1.33	7.84 ± 1.54	8.31 ± 1.05	0.39			
Total-cholesterol (mg/dl)	167.39 ± 39.72	162.96 ± 26.76	176.67 ± 31.58	0.31			
HDL-cholesterol (mg/dl)	58.40 ± 11.23	61.54 ± 14.48	54.22 ± 12.12	0.24			
Triglycerides (mg/dl)	77.03 ± 51.66	56.71 ± 20.32	79.61 ± 40.90	0.10			
Diastolic pressure (mmHg)	69.57 ± 8.02	65.14 ± 7.62	71.39 ± 8.54	0.02	0.02	0.77	0.02
Systolic pressure (mmHg)	110.83 ± 13.48	103.46 ± 11.64	116.11 ± 9.63	0.002	0.02	0.01	0.001

Data are reported as mean ± SD or counts and compared with the Kruskall Wallis test or the Fisher exact test

Adjusted for age, significant differences in biochemical and functional parameters among the three groups were demonstrated, in particular for systolic (p=0.002) and diastolic pressure (p=0.02) and eGDR (p=0.039) (Figure 1).

No differences in daily insulin dose (p=0.75) and glycated hemoglobin (p=0.39) were observed.

Noteworthy differences were observed between AS and NS subjects for systolic (p=0.01) pressure and eGDR level (p=0.02), between AS and PS subjects for both systolic (p=0.001) and diastolic (p=0.02) pressure and eGDR (p<0.001) and between PS and NS for systolic (p=0.02) and diastolic (p=0.02) pressure and eGDR (p=0.01).
In a multivariable model adjusted for age, gender, BMI and physical activity, smoking habits did not maintain any independent association with metabolic parameters.

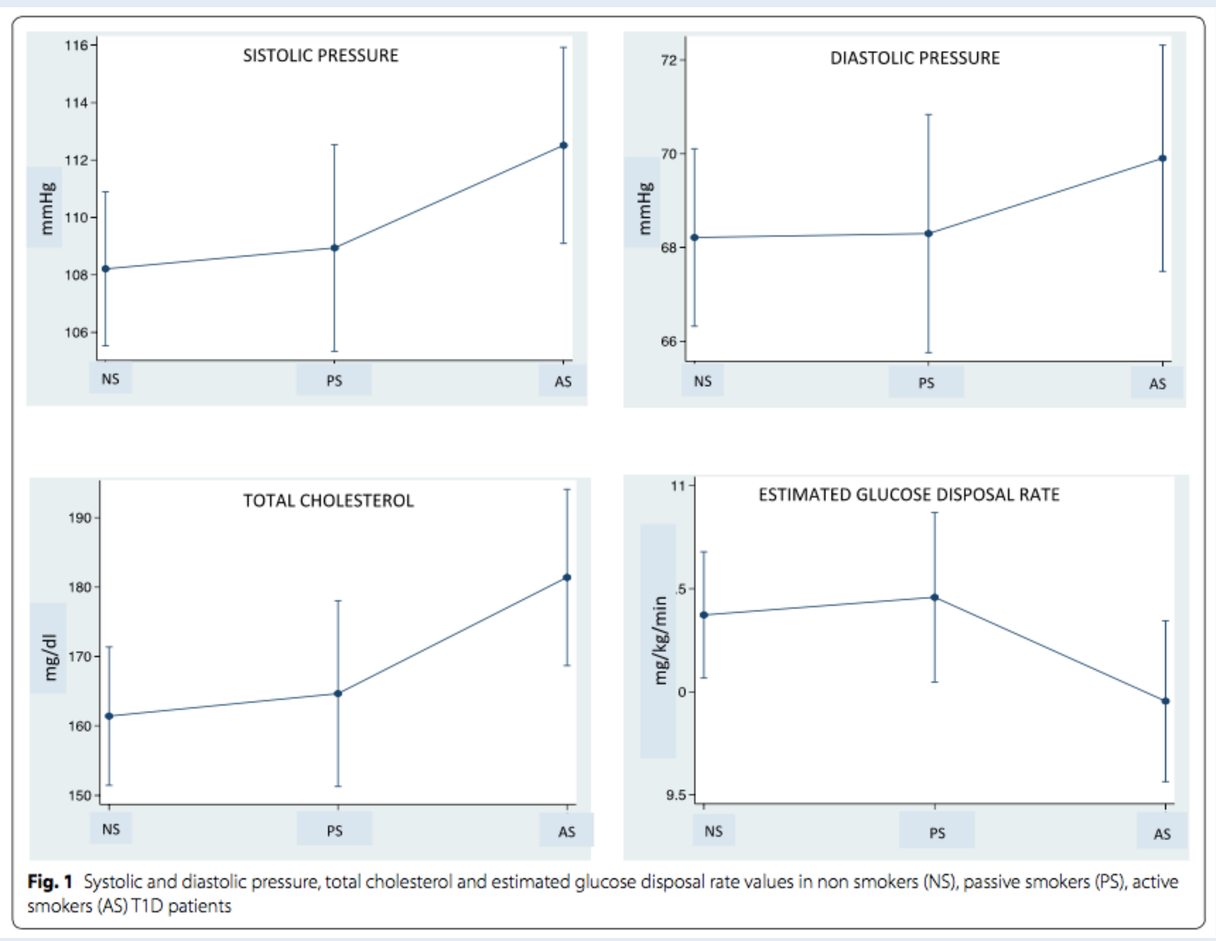

Fig. 1 Systolic and diastolic pressure, total cholesterol and estimated glucose disposal rate values in non smokers (NS), passive smokers (PS), active smokers (AS) T1D patients

Conclusions

This is the first study in a Mediterranean population, looking at tobacco smoke and cardio-metabolic factors in youth with T1D. The relationship between smoking and unfavorable metabolic profile was demonstrated. On the basis of these findings, smoking tobacco should be considered an important modifiable risk factor for young patients with diabetes mellitus, highlighting the need for intensified smoking prevention and cessation programs.