

BACKGROUND

Diabetic ketoacidosis (DKA) is the most serious life-threatening (0.15%–0.31% mortality rate) acute complication of T1D with a current rate ranging from 12% to more than 80% of cases worldwide. Although previous studies have characterized the main risk factors associated to DKA at T1D onset, few data are available evaluating the possible role of adiposity indexes in paediatric DKA in a well selected population of prepubertal children.

AIM OF THE STUDY

We aimed to identify the possible correlation between adiposity indexes and the presence and severity of DKA at T1D onset.

MATERIALS AND METHODS

195 prepubertal children (84 Female/111 Male) diagnosed between October 2010 and December 2018 at the Paediatric Department in Chieti were evaluated. Only children older than 2 years and without signs of pubertal development according to Tanner stage (thus younger than 11 years and 12 years for female and male, respectively) were included. In addition, children with chronic diseases or corticosteroid therapy at the admission were excluded. Anthropometric measurements (birth weight, height, height-SDS, weight, weight-SDS, BMI, BMI-SDS) were determined. At admission, fasting blood samples were collected for glucose, venous pH, electrolytes, bicarbonate, ketones and glycosylated hemoglobin (HbA1c) measurement. In addition, the presence or absence of DKA was evaluated and according to pH values DKA severity was categorized as mild (< 7.3), moderate (< 7.2), and severe (< 7.1).

Statistical Analysis

- A Spearman test was performed to evaluate any possible correlation between BMI-SDS values and the main variable of interest at onset.
- In order to characterize the effects of adiposity on the main variables of interest at onset, the study population was divided according to BMI-SDS into three tertile groups.
- The Kruskal-Wallis analysis was performed to evaluate differences across the tertile groups while the Mann-Whitney test for the post hoc analysis.
- $P < 0.05$ were considered statistically significant.

RESULTS [1]

Table 1. Clinical and biochemical characteristics of the study population

	Mean (±SD)
Sample size	195
Sex (Female; % / Male; %)	84 (43%) / 111 (57%)
Age at onset of T1D (years)	7.1±2.7
Birth weight (g)	3356±503
Weight (kg)	27.8±11.2
Weight-SDS	0.06±1.1
Height (cm)	124±18
Height-SDS	0.29±1.23
BMI (Kg/m ²)	17.3±3.1
BMI-SDS	-1.08±13.9
HbA1c (%)	11.4±2.2
Glycemia (mg/dL)	380±161
pH	7.3±0.10
Ketoacidosis (yes;% / no;%)	71 (36%) / 124 (64)
DKA severity (Female/Male):	(P=0.17)
-No DKA	56/68
-DKA Mild	19/19
-DKA Moderate	7/21
-DKA Severe	3/2

RESULTS [2]

Figure 1. Association between venous pH and BMI-SDS

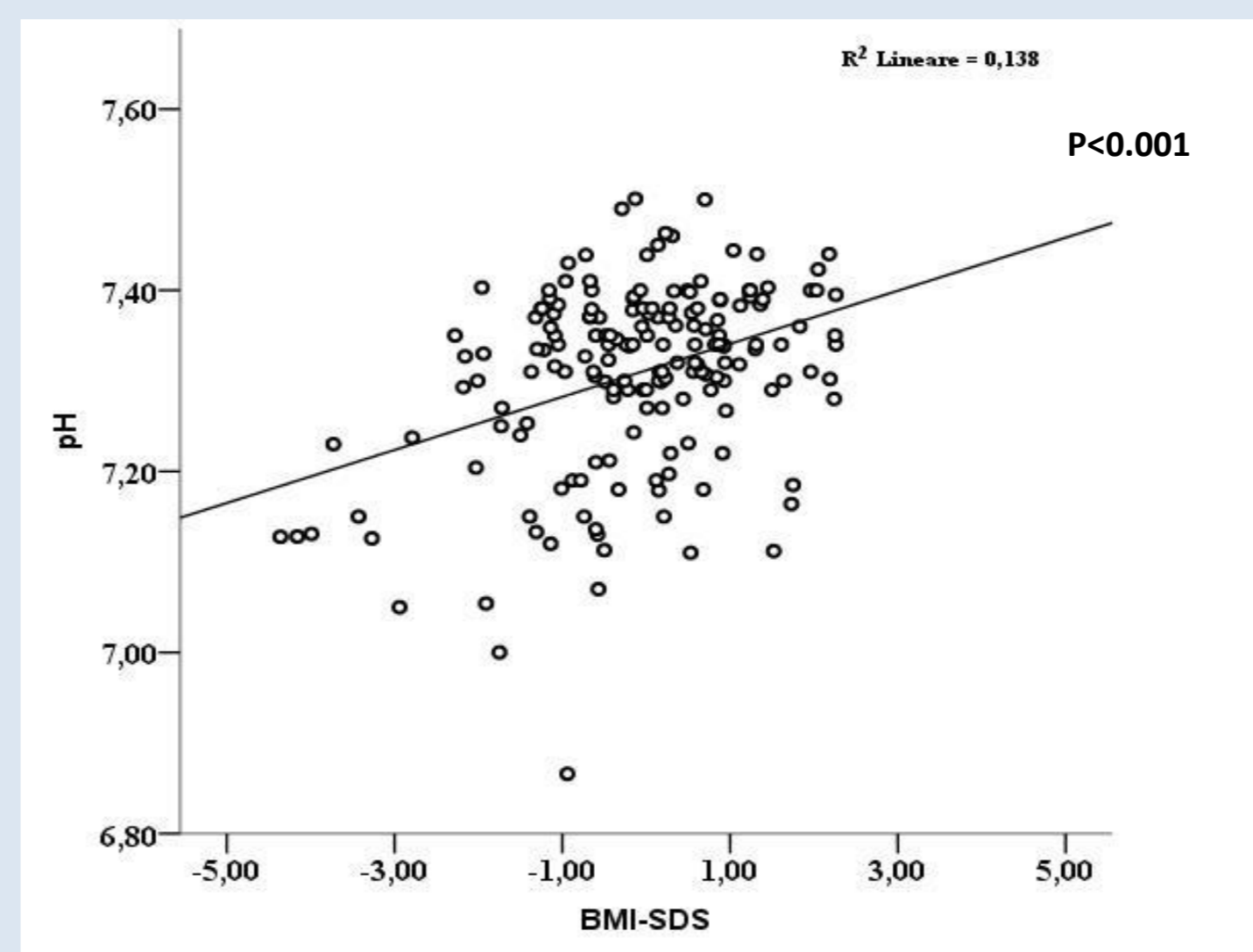


Figure 2. Association between HbA1c and BMI-SDS

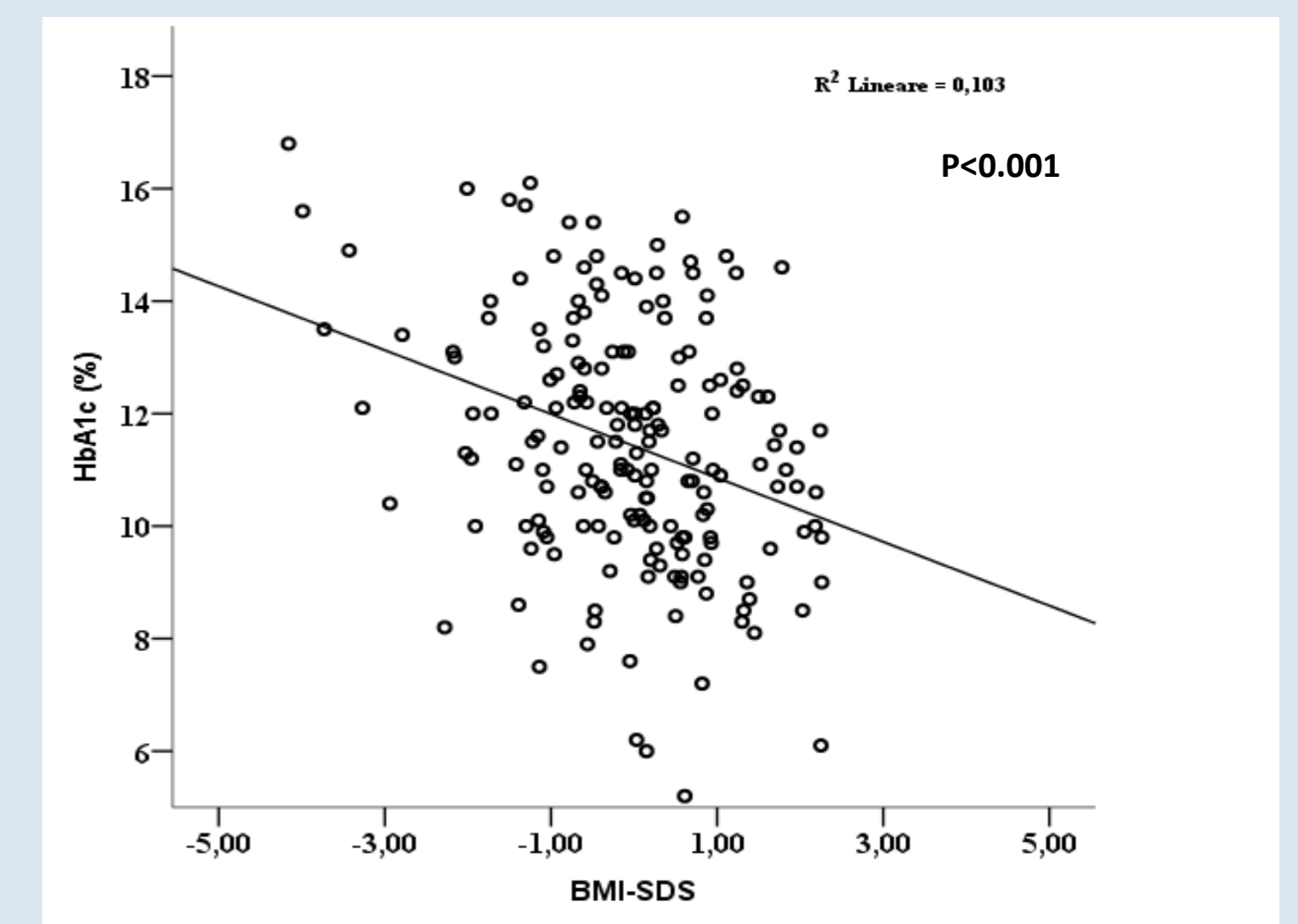


Figure 3. Association between age and BMI-SDS

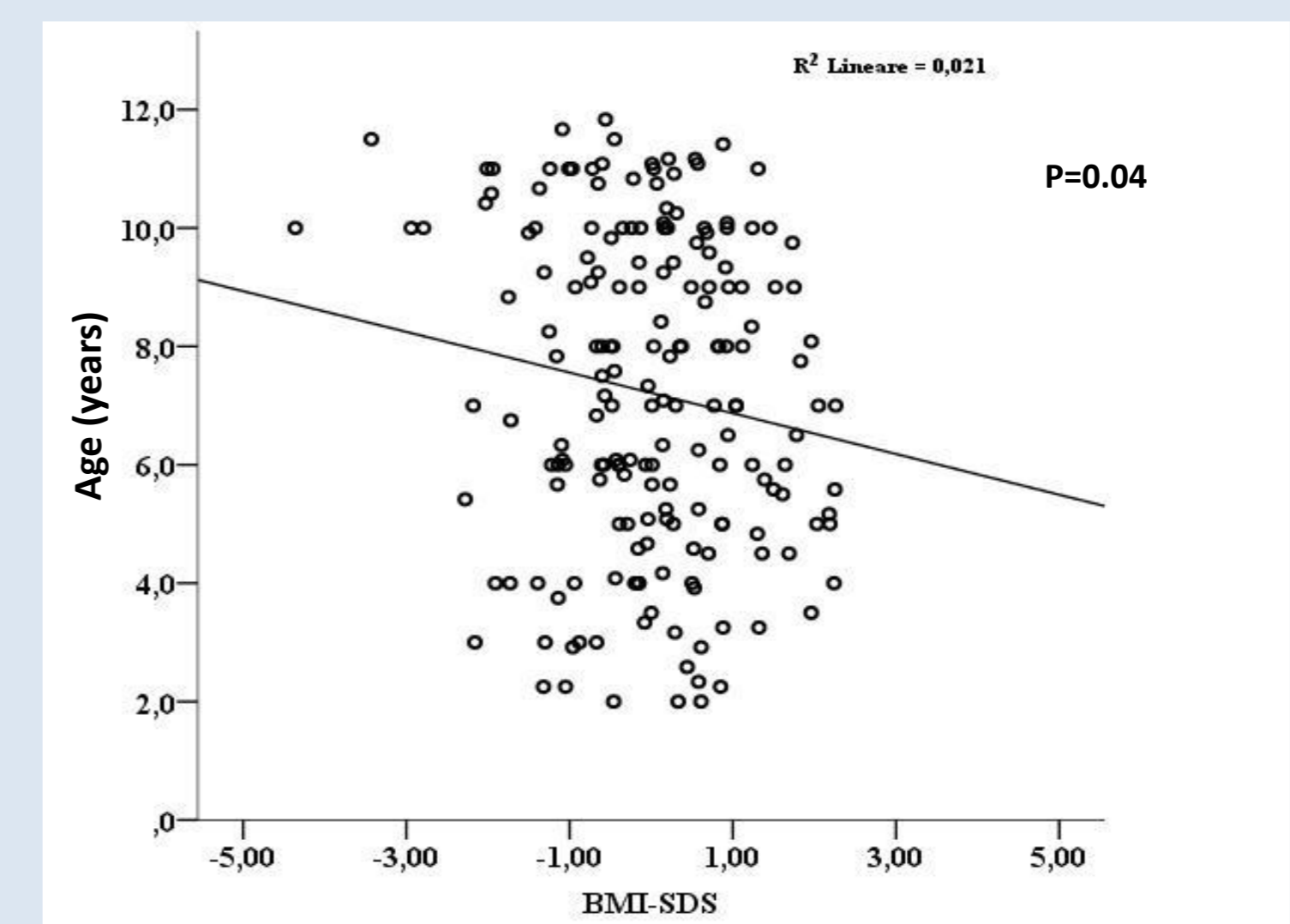


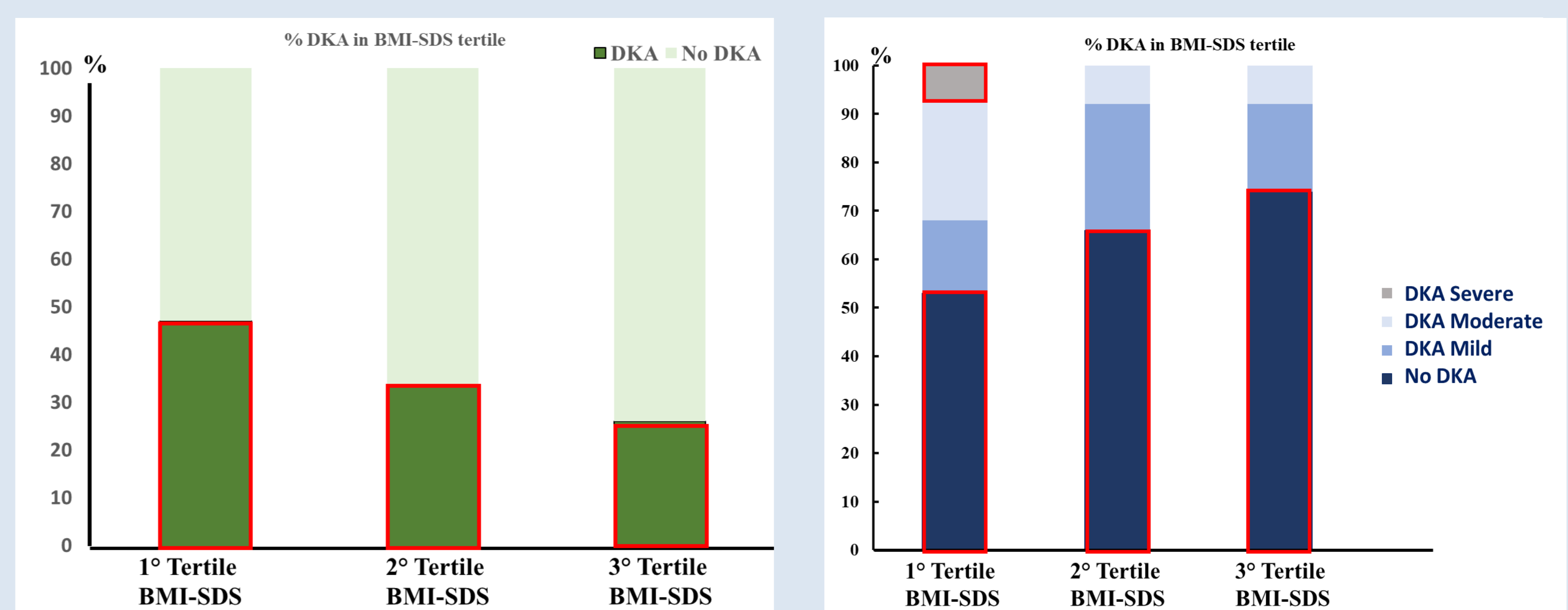
Table 2. Correlations between BMI-SDS (tertile) and anthropometric measurements

	BMI-SDS 1° TERTILE BMI-SDS<-0.44	BMI-SDS 2° TERTILE -0.44<BMI-SDS>0.48	BMI-SDS 3° TERTILE BMI-SDS>0.48	P value
Sample size	65	65	65	
Sex (F/M)	24/41	28/37	25/40	0.21
Age at onset of T1D (years)	7.4±2.9	7.1±2.7	7.2±2.6	0.79
Birth weight (g)	3356±535	3353±558	3352±429	0.11
Weight (kg)	23.9±8.5	26.0±8.8	34.5±12.8	<0.001*§#
Weight-SDS	-0.87±0.93	-0.93±0.64	1.20±0.77	<0.001*§#
Height (cm)	125±19	122±17	126±18	0.372
Height-SDS	0.11±0.99	-0.06±0.98	0.52±0.99	0.004§#
BMI (Kg/m ²)	14.7±1.2	16.8±1.2	20.6±2.8	<0.001*§#
BMI-SDS	-4.39±23.7	-0.14±0.26	1.19±0.55	<0.001*§#
HbA1c (%)	12.3±2.2	11.3±1.9	10.8±2.1	0.001*§
Glycemia (mg/dL)	433±165	407±154	300±131	<0.001§#
pH	7.26±0.12	7.33±0.08	7.33±0.08	0.004*§
Ketoacidosis (yes;%/no;%)	31 (48%)/34 (52%)	22 (34%)/43 (66%)	17 (26%)/48 (74%)	0.03

* P<0.05 for Post hoc analysis: 1° BMI-SDS tertile vs 2° BMI-SDS tertile
P<0.05 for Post hoc analysis: 2° BMI-SDS tertile vs 3° BMI-SDS tertile

§ P<0.05 for Post hoc analysis: 1° BMI-SDS tertile vs 3° BMI-SDS tertile

Figure 4. % DKA in BMI-SDS tertile



CONCLUSIONS

Adiposity indexes correlate significantly and directly with the presence and degree of DKA at the onset of T1D in children. BMI-SDS values are directly correlated with pH values and inversely with HbA1c levels and an age of onset of DKA. With the increase of the BMI-SDS tertile, we observe a progressive reduction in the prevalence of DKA and its degree of severity.