

# PCOS in women with type 1 diabetes mellitus is not related to diabetes duration or insulin dose

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## INTRODUCTION

Polycystic ovary syndrome (PCOS) is highly prevalent in women with type 1 diabetes mellitus (T1DM), possibly due to premenarchal exogenous hyperinsulinism due to supraphysiologic doses and nonphysiologic route of insulin administration. Our aim was to determine if PCOS was related to daily or basal insulin dose or T1DM duration.

## METHODS

We examined 47 women with T1DM (mean age 36.02 years,  $\pm 6.03$ ) treated with continuous subcutaneous insulin infusion (CSII) (78.7%) or basal/bolus insulin therapy. Participants reported medical history, underwent clinical examination, endocrine testing and ovarian ultrasound scan. Rotterdam criteria were used to diagnose PCOS.

## CONCLUSION

We confirmed high prevalence of PCOS in our population with long duration and good metabolic control of T1DM. However, no difference was observed in daily insulin dose or basal insulin dose and T1DM duration and premenarchal onset of T1DM between PCOS and non-PCOS group.

Curiously, a correlation between daily insulin dose and basal insulin dose to free testosterone concentration was observed in the study population. Factors other than exogenous hyperinsulinemia, possibly genetics and epigenetics, might be important in pathogenesis of PCOS in women with T1DM.

## RESULTS

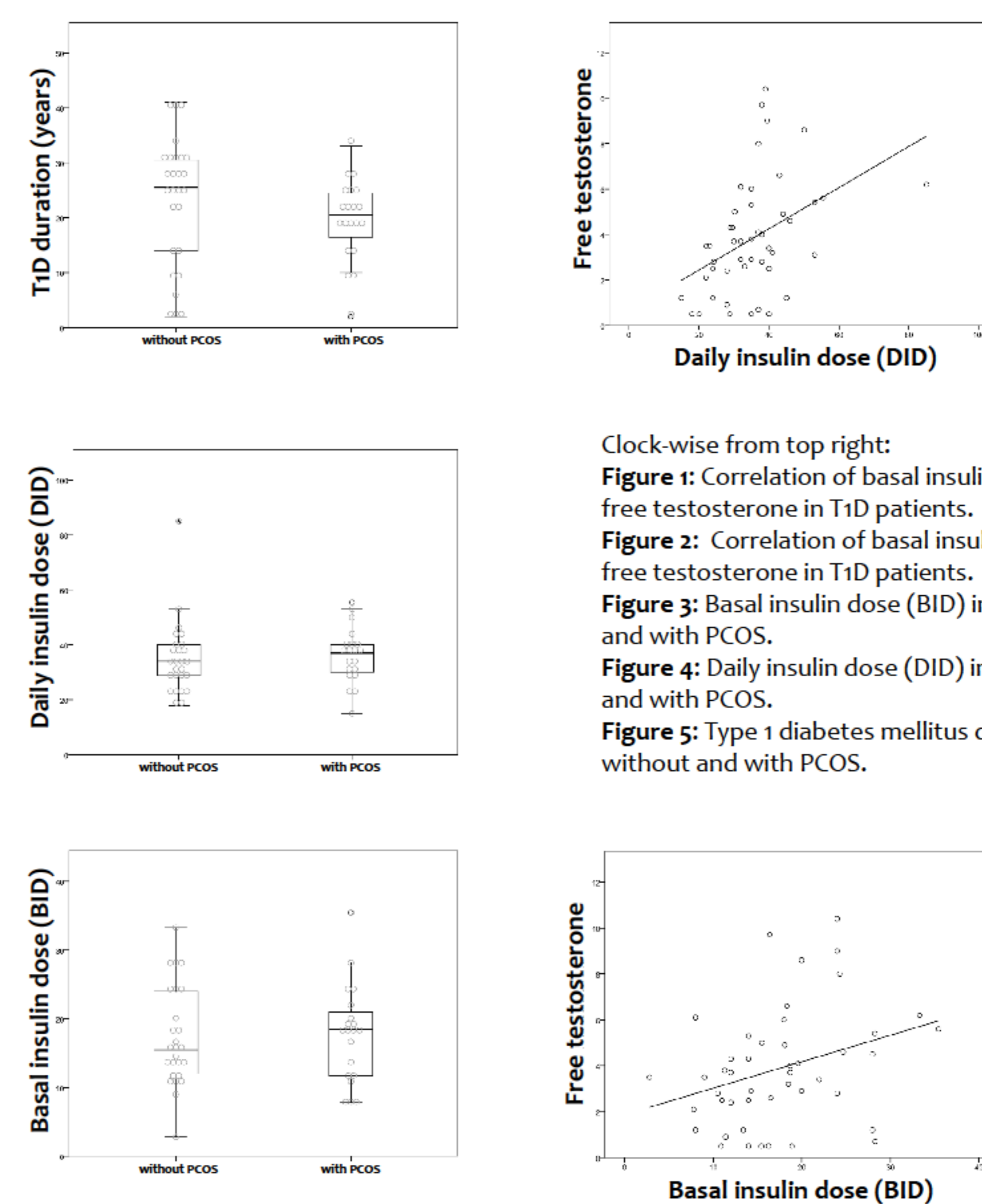
Table 1: Clinical characteristic of the patients.

Characteristic		All patients (N=47)	Patients without PCOS (N=27)	Patients with PCOS (N=20)
		Mean $\pm$ SD	Mean $\pm$ SD	Mean $\pm$ SD
Age at inclusion in the study (years)		36.02 $\pm$ 6.03	37.52 $\pm$ 6.33	34 $\pm$ 5.09
Age at T1D diagnosis (years)		14.2 $\pm$ 7.51	14.35 $\pm$ 8.51	14 $\pm$ 6.13
Weight (kg)		68.13 $\pm$ 12.17	66.44 $\pm$ 9.97	70.4 $\pm$ 14.6
BMI (kg/m <sup>2</sup> )		24.9 $\pm$ 4.19	24.54 $\pm$ 3.86	25.39 $\pm$ 4.66
T1D duration (years)		21.82 $\pm$ 10.08	23.17 $\pm$ 11.74	20.00 $\pm$ 7.16
T1D before menarche N (%)	no	27 (58.7)	15 (55.6)	12 (63.2)
	yes	19 (41.3)	12 (44.4)	7 (36.8)
Daily insulin dose (DID)		35.63 $\pm$ 11.89	35.25 $\pm$ 13.34	36.11 $\pm$ 10.02
Basal insulin dose (BID)		17.47 $\pm$ 7.07	17.28 $\pm$ 7.15	17.72 $\pm$ 7.13
HbA1c (%)		7.28 $\pm$ 0.81	7.22 $\pm$ 0.83	7.36 $\pm$ 0.81
Menstrual cycles (N/month)		0.89 $\pm$ 0.23	0.9 $\pm$ 0.28	0.87 $\pm$ 0.15
Total testosterone (nmol/l)		1.21 $\pm$ 0.64	1.01 $\pm$ 0.52	1.47 $\pm$ 0.70
Free testosterone (pmol/l)		3.87 $\pm$ 2.51	3.3 $\pm$ 2.17	4.63 $\pm$ 2.78
Androstenedione (nmol/l)		6.73 $\pm$ 3.06	5.76 $\pm$ 2.61	8.04 $\pm$ 3.19
DHEA-S (mcmol/l)		4.33 $\pm$ 2.06	3.76 $\pm$ 1.59	5.11 $\pm$ 2.4
SHBG (nmol/l)		83.74 $\pm$ 34.03	87.59 $\pm$ 35.61	78.55 $\pm$ 31.93
FAI		1.9 $\pm$ 1.79	1.4 $\pm$ 0.95	2.57 $\pm$ 2.39
Treatment N (%)	CSII	37 (78.7)	22 (81.5)	15 (75.0)
	basal/bolus	10 (21.3)	5 (18.5)	5 (25.0)

Neither comparison of daily insulin dose (DID) and basal insulin dose (BID), premenarchal onset and T1DM duration nor multivariable logistic regression revealed statistically significant differences between the groups.

No significant correlation between PCO ovarian morphology, DID and/or BID and/or T1DM duration was found.

Statistically significant correlations in our sample were: correlation of DID to weight ( $p < 0.001$ ) and BMI ( $p < 0.001$ ), BID to BMI ( $p = 0.001$ ), DID to free testosterone concentration ( $p = 0.001$ ), BID to free testosterone concentration ( $p = 0.014$ ) and T1DM duration to BMI ( $p = 0.022$ ).



Clock-wise from top right:  
Figure 1: Correlation of basal insulin dose (BID) and free testosterone in T1D patients.  
Figure 2: Correlation of basal insulin dose (BID) and free testosterone in T1D patients.  
Figure 3: Basal insulin dose (BID) in patients without and with PCOS.  
Figure 4: Daily insulin dose (DID) in patients without and with PCOS.  
Figure 5: Type 1 diabetes mellitus duration in patients without and with PCOS.

Table 2: Correlations between insulin doses and T1D duration and other clinical characteristics.

Characteristic	Daily insulin dose (DID)		Basal insulin dose (BID)		T1D duration	
	Spearman's rho	P	Spearman's rho	P	Spearman's rho	P
Weight	0.584	<0.001	0.369	0.012	0.260	0.077
BMI	0.628	<0.001	0.457	0.001	0.333	0.022
Menstrual cycles	0.210	0.171	0.223	0.151	0.309	0.041
Total testosterone	0.165	0.275	0.045	0.765	-0.054	0.719
Free testosterone	0.480	0.001	0.359	0.014	0.213	0.151
Androstenedione	0.171	0.256	0.079	0.602	-0.116	0.438
DHEA-S	-0.007	0.962	-0.091	0.547	-0.179	0.230
SHBG	-0.108	0.473	0.077	0.611	0.200	0.177
FAI	0.202	0.178	-0.017	0.913	-0.176	0.236