

# Serum Dihydrotestosterone Equivalent Levels in Women -A New Index of Hyperandrogenemia-

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## Introduction

- The measurement of androgens is critical for the diagnosis of polycystic ovary syndrome (PCOS) but it has been difficult based on poor specificity and sensitivity of assays in the female range.
- The direct total androgen activity can be measured with dihydrotestosterone equivalent concentration (DEQ) using chemically activated luciferase gene expression (CALUX) bioassays.
- The aim of the study is to determine whether DEQ levels can be the index for hyperandrogenemia to be required for diagnosis of PCOS.

## Subjects and Methods

- Cross-sectional study**  
100 women with PCOS (age 26±4 yrs, range 16~39 yrs) and 100 regular cycling healthy women (age 26±4 yrs, range 16~39 yrs)
- Anthropometric measurements**
- Hormonal parameters:** total testosterone (T), androstenedione (A), calculated free testosterone from T (fTc) and SHBG, and DHEAS
- DEQ levels by CALUX bioassay**
- 75g oral glucose tolerance test and lipid levels**

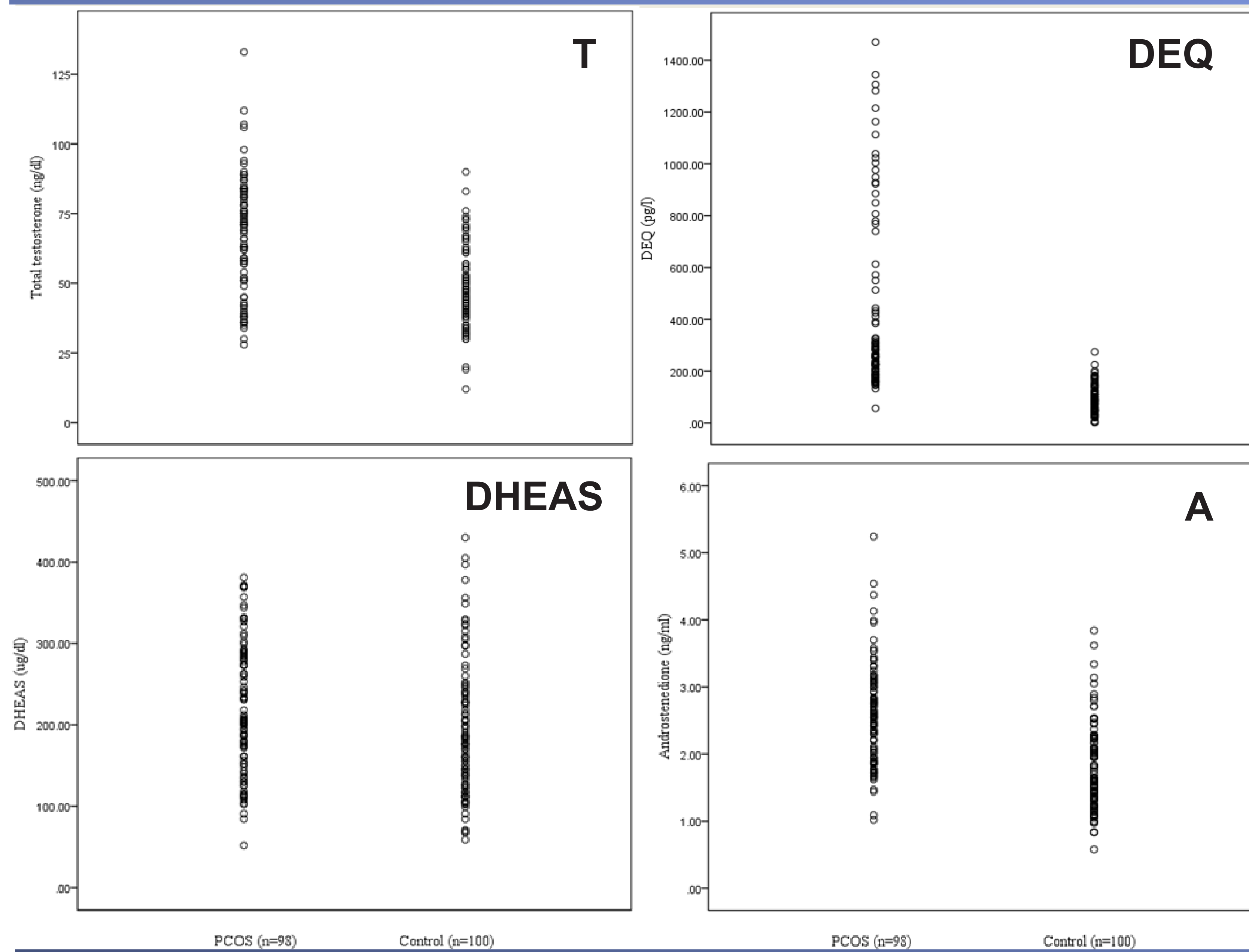
## Clinical and Biochemical Characteristics of the Subjects

	PCOS (n=100)	Control (n=100)	P-value
Age (y)	26±4	26±4	0.689
Body mass index (kg/m <sup>2</sup> )	22.2±4.0	22.2±4.0	0.989
Waist circumference (cm)	75±10	75±10	0.840
Systolic blood pressure (mmHg)	108±10	108±11	0.749
Diastolic blood pressure (mmHg)	70±8	71±9	0.126
<b>DEQ (pg/l)</b>	<b>412.5±339.6</b>	<b>89.6±53.5</b>	<b>&lt;0.001</b>
Total testosterone (ng/dl)	67±20	48±14	<0.001
SHBG	72±43	100±55	<0.001
Free testosterone (ng/dl)	0.86±0.45	0.44±0.22	<0.001
Free androgen index	5.1±5.7	2.2±1.4	<0.001
Androstenedione (ng/ml)	2.58±0.76	1.80±0.62	<0.001
DHEAS (ug/dl)	219.6±79.2	193.8±81.9	0.026
Modified FG score	5±5	4±3	0.170
Fasting plasma glucose (mg/dl)	85±8	86±7	0.446
Post-load 2-h plasma glucose (mg/dl)	103±25	96±18	0.027
Fasting plasma insulin (mIU/l)	8.2±5.3	4.7±5.0	0.010
Post-load 2-h plasma insulin (mIU/l)	59.8±72.8	32.1±38.4	0.004
HOMA-IR	1.76±1.22	1.06±1.17	0.012
Total cholesterol (mg/dl)	186±33	174±30	0.012
Triglycerides (mg/dl)	86±47	81±50	0.400
HDL cholesterol (mg/dl)	51±13	48±11	0.167
LDL cholesterol (mg/dl)	118±29	110±26	0.042
Ovarian volume (cm <sup>3</sup> )	9±3	5±2	<0.001
Ovarian follicle number	11±3	6±2	<0.001
Menses/year	5±2	10±0	<0.001

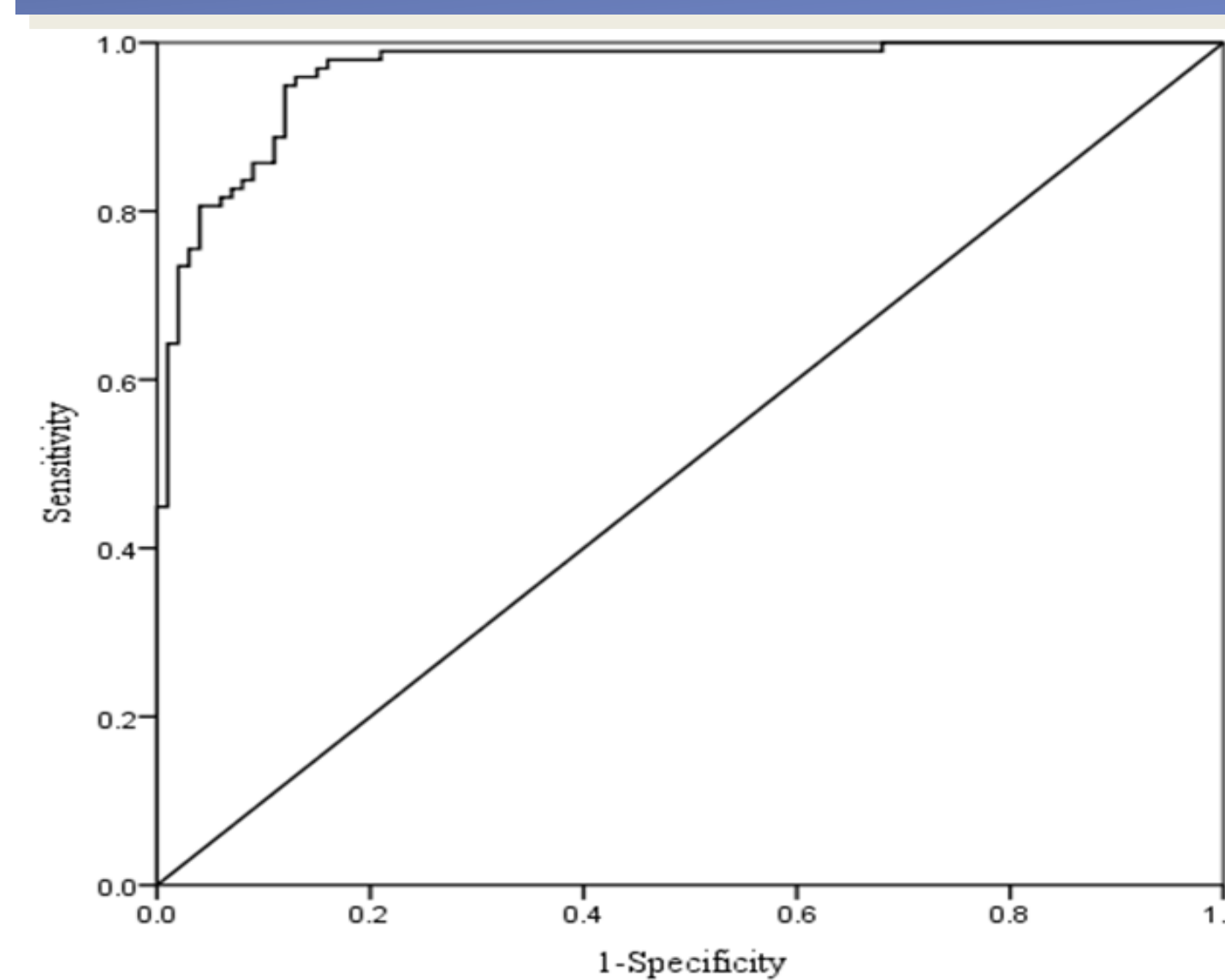
## Correlation of DEQ levels with Various Androgens

Variables	Correlation coefficients	P-value
Total testosterone	0.40	<0.001
SHBG	-0.25	<0.001
Free testosterone	0.45	<0.001
Free androgen index	0.41	<0.001
Androstenedione	0.49	<0.001
DHEAS	0.28	<0.001

## Distribution of Androgen Levels in PCOS Women and Controls



## ROC curve for DEQ Cutoff value to Predict PCOS



DEQ (pg/l)	Sensitivity (%)	Specificity (%)
146.9	96.0	85.0
149.5	96.0	86.0
151.9	96.0	87.0
153.2	94.9	87.0
154.6	94.9	88.0

## Summary and Conclusion

- A correlation of T, A ( $r=0.41$ ,  $P<0.001$ ) and fTc ( $r=0.45$ ,  $P<0.001$ ) with DEQ levels was significant.
- DEQ levels were significantly higher in women with PCOS compared to controls ( $P<0.05$ ).
- Increased levels (95percentile of serum levels in control women) of T, fTc, A and DEQ were noted in 73%, 71%, 69% and 82% in women with PCOS, respectively.
- A total of 98% of the subjects with the highest quartile of DEQ levels had PCOS.
- The optimal DEQ cutoff value for predicting PCOS was 151.9 pg/L and the area under the ROC curve was 0.97.
- The DEQ levels were correlated with ovarian volume and ovarian follicle number, total cholesterol, LDL cholesterol, fasting plasma insulin, post-load 2-h plasma insulin.

*DEQ levels may be a good indicator of hyperandrogenemia in women and the measurement of DEQ levels in serum can be useful in making a diagnosis of PCOS.*

