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## Introduction

The standard method to diagnose central precocious puberty (CPP) is the gonadotropin releasing hormone stimulation test (GnRHST). However, it is inconvenient for children because of its time-consuming and requiring multiple samples. This study aimed to determine the reliability of morning unstimulated luteinizing hormone (LH) level when screening for CPP, with an emphasis on the influence of its diurnal variation.

## Methods

This retrospective study included 160 girls with signs of early puberty (SMR 2) under 8 years of age. They were classified as CPP or non-CPP based on their standard GnRHST. The auxological, biochemical and hormonal characteristics of subjects were evaluated. We examined the prognostic value of single morning basal gonadotropin level when screening for CPP.

## Results

Table 1. Comparison of auxological and biochemical characteristics between central precocious puberty and non-CPP group

Characteristics	Total	CPP(n=121)	Prepubertal(n=39)	P-value
Subjects, n(%)	160 (100)	121 (75.6)	39 (24.4)	
Chronologic age (yr)	7.84±0.75	7.87±0.74	7.74±0.75	0.33
Bone age (yr)	9.31±0.11	10.27±0.09	10.01±0.18	0.22
Bone age-Chronologic age (yr)	1.36±0.74	1.40±0.74	1.25±0.72	0.277
Height (cm)	132.94±7.37	133.31±7.45	131.80±7.08	0.269
Height Z score	0.00±1.00	0.05±1.01	0.15±0.96	0.269
Body weight (kg)	31.93±6.33	31.94±6.01	31.92±7.32	0.984
Body weight Z score	0.00±1.00	0.00±0.95	0.00±1.16	0.984
Body Mass Index	17.93±2.41	17.84±2.22	18.19±2.95	0.506
Body Mass Index Z score	0.00±1.00	0.03±0.92	0.11±1.22	0.506
Basal LH (IU/L)	0.81±1.61	1.01±1.81	0.21±0.28	<.0001
Basal FSH (IU/L)	3.56±2.04	3.93±2.06	2.39±1.43	<.0001
Basal LH/FSH ratio	0.18±0.23	0.21±0.25	0.08±0.05	<.0001

Table 2. Coefficient of correlation by Pearson method between unstimulated morning Gonadotropin-releasing hormone (GnRH) variables and Gonadotropin-releasing hormone stimulation test (GnRHST) variables

Variable	Correlation coefficient	P-value
Basal LH (IU/L)	0.532	<.0001
Basal FSH (IU/L)	0.310	<.0001
Basal LH/FSH ratio	0.574	<.0001

LH, luteinizing hormone; FSH, follicular stimulating hormone.

Table 3. Univariate logistic regression analysis of factors affecting the pubertal response of the gonadotropin-releasing hormone stimulation test.

Variable	Univariate analysis	
	OR (95% CI)	P-value
Chronologic age (yr)	1.02 (0.98-1.06)	0.330
Bone age (yr)	1.02 (0.99-1.05)	0.220
Bone age - Chronologic age (yr)	1.02 (0.98-1.07)	0.276
Height (cm)	1.03 (0.98-1.08)	0.269
Weight (kg)	1.00 (0.95-1.06)	0.984
Body mass index	0.94 (0.81-1.09)	0.438
Basal LH (IU/L)	17.02 (2.80-103.68)	0.002
Basal FSH (IU/L)	1.77 (1.33-2.35)	<0.001
Basal LH/FSH ratio	Infinite (26.28-infinite)	0.003

OR, odds ratio; CI, confidence interval; LH, luteinizing hormone; FSH, follicular stimulating hormone.

Fig. 1. Receiver operator characteristic (ROC) curve of various thresholds of morning unstimulated LH levels (area under the curve [AUC], 0.757; 95% confidence interval [CI], 0.684 to 0.831) for predicting central precocious puberty.

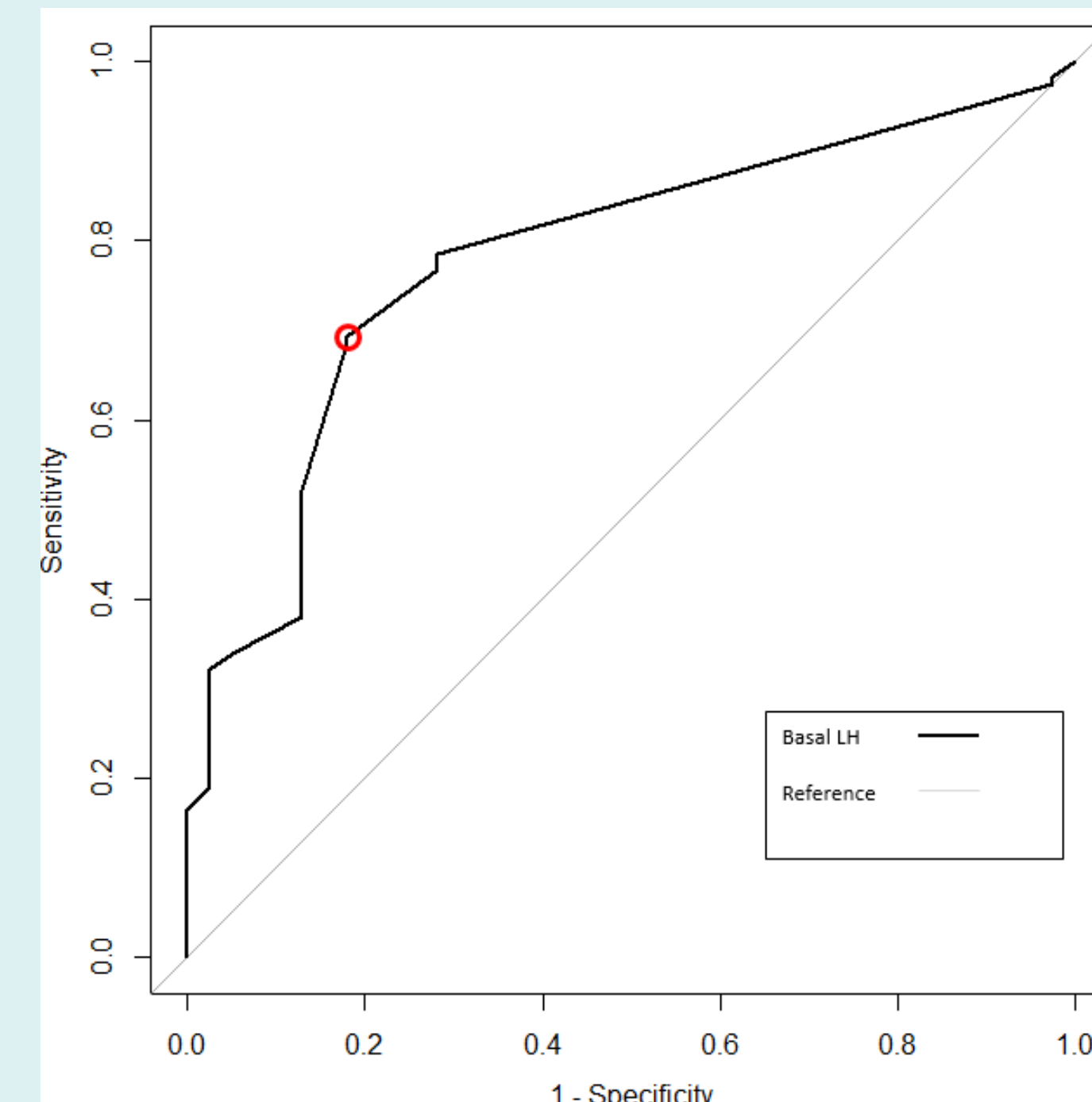


Table 4. Multiple logistic regression analysis of factors affecting the pubertal response of the gonadotropin-releasing hormone stimulation test.

Variable	Univariate analysis	
	OR (95% CI)	P-value
Bone age - Chronologic age (yr)	1.018 (0.967-1.071)	0.5058
Body mass index	0.874 (0.583-1.310)	0.5151
Basal LH (IU/L) <0.22	1	
Basal LH (IU/L) ≥0.22	9.596(3.853-23.900)	<.0001

OR, odds ratio; CI, confidence interval; LH, luteinizing hormone; FSH, follicular stimulating hormone.

Fig. 2. Probability of positive response after gonadotropin-releasing hormone (GnRH) stimulation according to basal luteinizing hormone and basal follicular stimulating hormone (FSH).

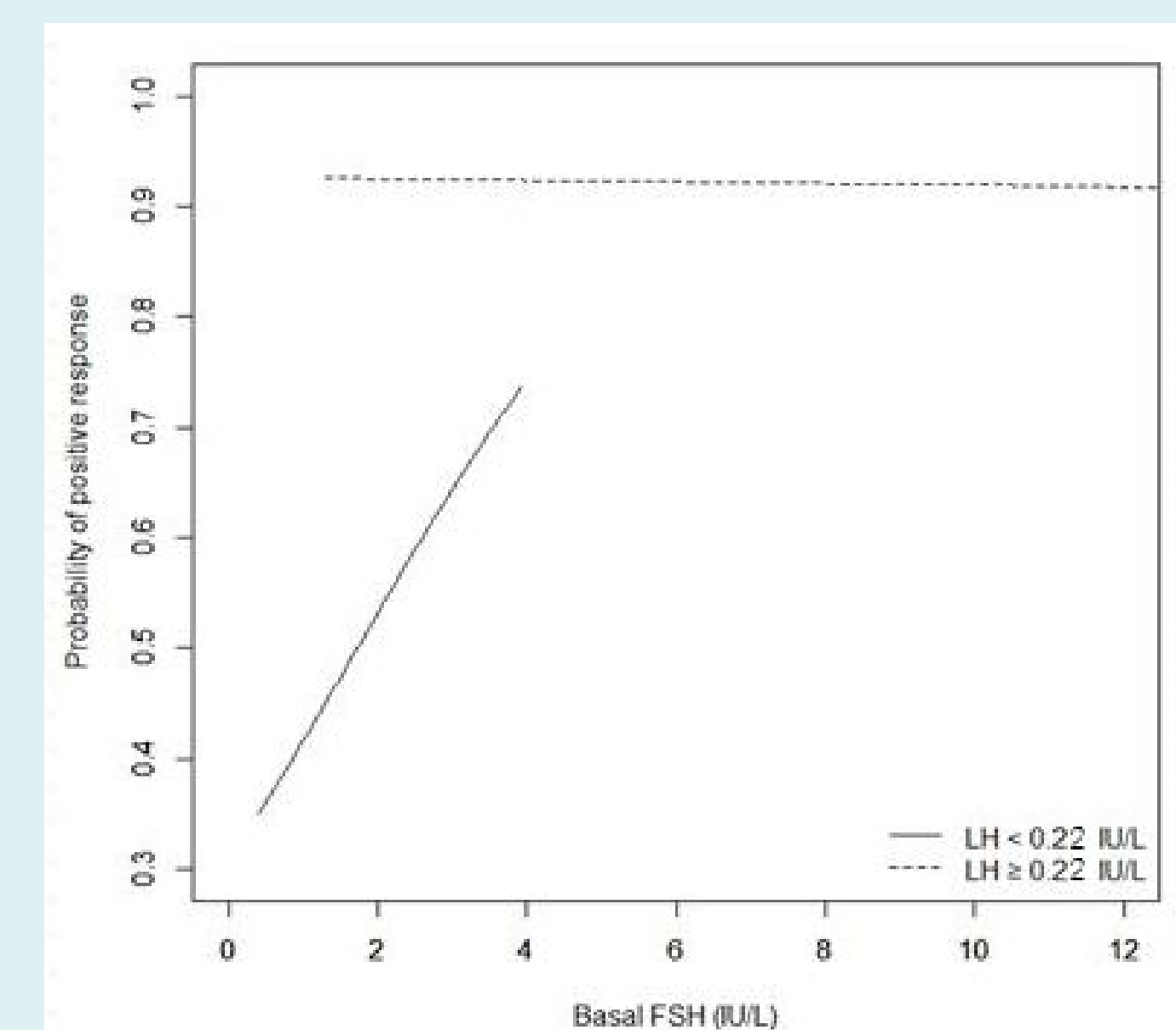
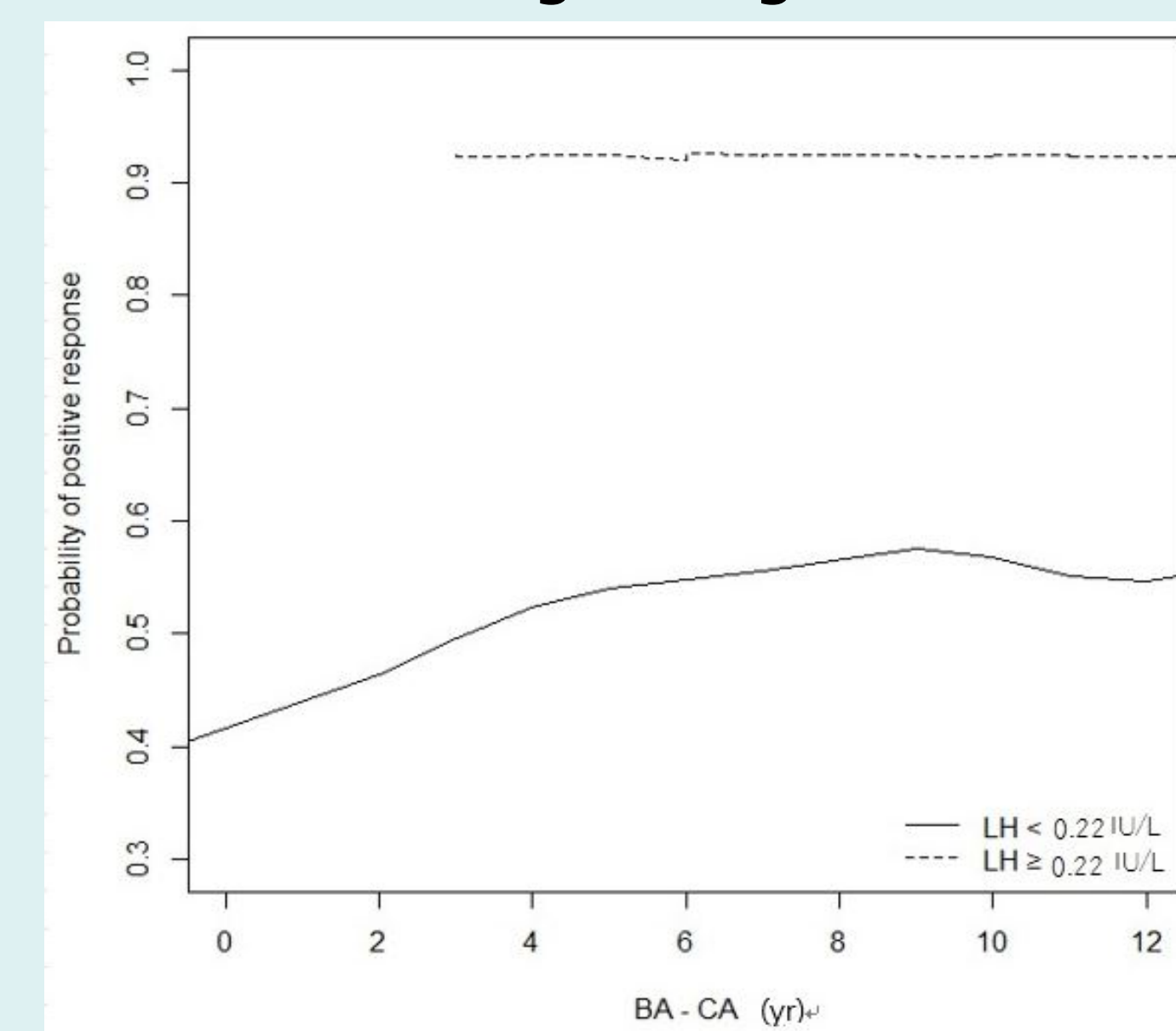


Fig. 3. Probability of positive response after gonadotropin-releasing hormone (GnRH) stimulation according to basal luteinizing hormone and the difference between the chronological age and bone age (yr).



## Conclusion

Single morning unstimulated LH presented clinical efficacy for screening of CPP, but BA advanced over chronological age (CA) and BMI alone are not useful as a single value of screening for CPP.