

Premature Thelarche Secondary to Lavender Exposure

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Introduction

Background

Premature thelarche refers to isolated breast development before the age of three in females.¹ We describe a case of premature thelarche, an example of reversible of benign or non-progressive precocious puberty that differs from true precocious puberty.

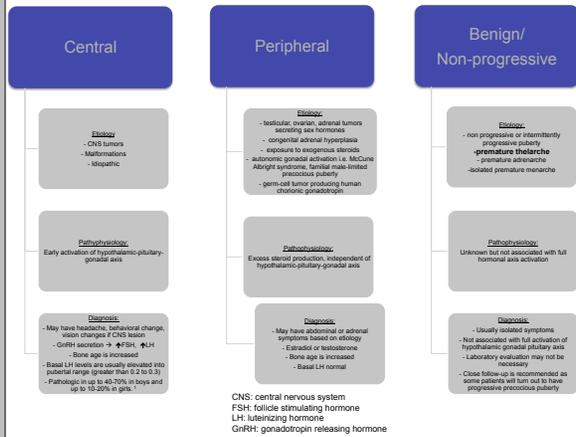
Precocious puberty refers to the early onset of secondary sexual characteristics.

- 2 to 2.5 standard deviations below the mean age of onset of puberty
- before age of eight in females and nine in males warrants workup, though there is controversy about the lower limit of normal pubertal development²
- most cases are benign or classified as idiopathic
- less common cases: pituitary and ectopic human chorionic gonadotropin hormone secretion or exogenous sources of sex steroids

Evaluation

History	Physical	Labs	Imaging
<ul style="list-style-type: none"> onset of symptoms age of puberty in family members headache vision changes behavior changes seizures abdominal pain previous CNS disease or trauma exposure to exogenous steroids 	<ul style="list-style-type: none"> height weight height velocity (cm/year) visual fields Café-au-lait spots Tanner staging 	<ul style="list-style-type: none"> basal luteinizing hormone follicle stimulating hormone either estradiol or testosterone if unclear, gonadotropin releasing hormone and luteinizing hormone response 	<ul style="list-style-type: none"> radiographic age of bone measurement all males with central precocious puberty: MRI brain Females <6 years old: brain MRI Males with peripheral: testicular ultrasound Females with peripheral: ovarian ultrasound Both genders with peripheral: adrenal imaging Benign: bone age only

Types of Precocious Puberty



Case

A 2 year + 5-month-old female presented with her parents to clinic with premature breast development. Parents reported at that time bilateral breast growth slowly over the previous five months. On history, patient had no growth acceleration, no acne or pubic hair, no vaginal bleeding, developmental milestones and behavior appropriate. Denied headaches. Exam and vitals were unremarkable except for bilateral Tanner stage III breast development and normal stage I axillary hair, no apocrine hair.

Past medical history:

The patient was born at term born via cesarean section for failure to progress and chorioamnionitis (for which she received intrapartum antibiotics). Pregnancy was complicated by mother with medication-controlled Graves' disease. Patient was clinically asymptomatic and was evaluated after admission by pediatric endocrinology with both labs and in-person follow up and cleared.

Patient had brief NICU stay for moderately increased work of breathing; with negative infectious workup, etiology thought to be most likely due to retained fetal lung fluid. During admission, she was also noted to have low resting heart rate in the 70-80s with normal perfusion and level of alertness, which responded appropriately to stimuli. EKG showed sinus bradycardia and echocardiogram showed patent ductus arteriosus, bicuspid aortic valve, and patent foramen ovale. Patient was seen multiple times by pediatric cardiology and repeat echocardiogram at age 9 months showed small atrial communications including a patent foramen ovale which per cardiology was unlikely to require future intervention.

At birth, R-sided 6x6cm nonpalpable, telangiectatic abdominal skin with arrested growth noted on exam. Patient was seen multiple times by pediatric dermatology and diagnosed as infantile hemangioma with minimal or arrested growth which did not require further follow up or intervention.

Past Surgical History: none

Family History: Father has lipomas and mother has Graves' disease and hypertension. Schwannoma, stroke, peripheral neuropathy and cardiovascular disease in maternal grandfather; maternal grandparents with hypertension.

Social History: Lives in San Diego with parents. No siblings. Father is high school teacher and mother is a pastry chef. No smokers in the home.

Medications: None

Allergies: None

Initial diagnosis: premature thelarche, rule out precocious puberty (central or peripheral)

Workup:

Lab Name	Patient Result	Reference Value
Luteinizing Hormone	0.02 mIU/mL	12-2 years: < or = 0.26 mIU/mL 8-9 years: < or = 0.69 mIU/mL 10-11 years: < or = 4.38 mIU/mL 12-14 years: 0.04-10.80 mIU/mL 15-17 years: 0.97-14.70 mIU/mL
Follicle Stimulating Hormone	4.83 mIU/mL	6-8 years: Not associated 6-9 years: 0.72-6.33 mIU/mL 10-13 years: 0.87-16 mIU/mL
Estradiol	3 pg/mL	1-9 years: < or = 16 pg/mL 10-11 years: < or = 65 pg/mL 12-14 years: < or = 142 pg/mL 15-17 years: < or = 283 pg/mL



Impression: Bone age within normal limits.

Treatment + Outcomes:

Initially parents reported no known exposures to lavender, tea tree, or essential oils. Given she had growth without other signs of puberty, suspicion was for benign precocious puberty. However, parents noted possible slight persistent breast growth suggesting ongoing estrogen exposure. After visit, parents went home and examined the products they were using for patient and realized the lotion they had been using contained lavender. They stopped using this and other products and breast tissue resolved.

Final diagnosis: premature thelarche, a form of benign/non-progressive precocious puberty, secondary to lavender exposure

The products used:

- Earth Mama Calming Lavender Baby Lotion
- EO hand soap
- Earth Mama Diaper Balm



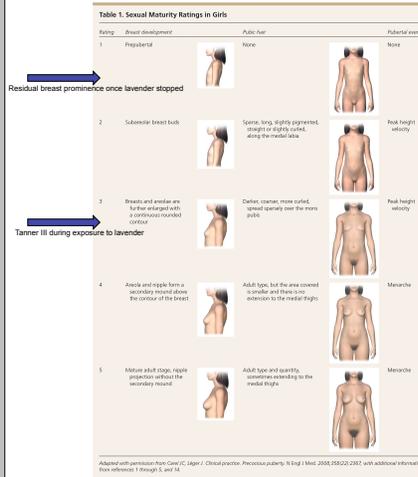
Discussion

Lavender is a common additive to many personal home and hygiene products for consumers of all ages. In primary care, we often recommend lavender to promote relaxation or combat anxiety. However, the literature reports that topical application of tea tree oil and lavender containing products can cause prepubertal gynecomastia in males and premature thelarche in females both in the setting of normal endogenous steroids.^{3,4} Studies have also demonstrated that these oils have estrogenic and anti-androgenic activities on human cell lines.⁴ It is important to understand the potential effects of such readily available products on our patients.

There is increasing evidence demonstrating endocrine disruption of estrogen affects related to common cosmetic and body products. As primary care providers, we must take careful histories and include these products in differential when appropriate. Overall, precocious puberty is uncommon so it may be reasonable to hold off on hormonal testing and imaging in girls and follow in a primary care clinic unless rate of tissue growth increases rapidly and/or associated with growth acceleration.⁵

Take Home Points:

- Lavender and tea tree containing products have been associated with premature puberty in males and females
- If no other concerning features on history/exam to suspect central or precocious puberty, can stop exposure and closely monitor symptoms



References

1. Kaplowitz, Paul. "Pediatric Endocrinology Fact Sheet. Premature Thelarche: A Guide for Families." Pediatric Endocrine Society.
2. Harrington, J and Palmert, M. "Definition, etiology and evaluation of precocious puberty." UpToDate. 2019 Sept.
3. Klein DA, Emerick JE, Sylvester JE, Vogt, KS. "Disorders of Puberty: A Guide to Diagnosis and Management." Am Family Physician 2017. Nov 1; 96:(9):990-999.
3. Linklater, A, and Hewitt, J.K. "Premature Thelarche in the Setting of High Lavender Oil Exposure." Journal of Paediatrics and Child Health. 51: 233-235. 2015.
5. Henley, D., Lipson, N., Korach, K.S., Block, C.A. "Prepubertal Gynecomastia Linked to Lavender and Tea Tree Oils." New England Journal of Medicine. 356: 479-485. 2007.
6. Kakaplowitz, P, and Bloch, C. "Evaluation and Referral of Children With signs of Early Puberty." Pediatrics. 137:1 January 2016.

Graphics:

Left column: Based on Harrington J, Palmert MR, Hamilton J. Use of local data to enhance uptake of published recommendations: an example from the diagnostic evaluation of precocious puberty. Arch Dis Child 2014; 99:15. Right column: Klein DA, Emerick JE, Sylvester JE, Vogt, KS. "Disorders of Puberty: A Guide to Diagnosis and Management." Am Family Physician 2017. Nov 1; 96:(9):990-999.