Steroid Hormone Profiles in Prepubertal Obese Children Before and After Weight Loss

Thomas Reinehr, Alexandra Kulle, Barbara Wolters, Nina Lass, Maik Welzel, Felix Riepe, and Paul-Martin Holterhus

Department of Pediatric Endocrinology, Diabetes, and Nutrition Medicine (T.R., B.W., N.L.), Vestische Hospital for Children and Adolescents Datteln, University of Witten/Herdecke, D-45711 Datteln, Germany; and Division of Pediatric Endocrinology and Diabetes (A.K., M.W., F.R., P.-M.H.), Department of Pediatrics, University Hospital of Schleswig-Holstein, Albrechts University of Kiel, D-24098 Kiel, Germany

Context: Little information is available on the steroid hormone profiles in obese children and their changes after weight loss.

Objective: We compared liquid chromatography-tandem mass spectrometry of serum steroid hormone profiles between obese and normal-weight children and studied the differential effects of weight loss on these hormones.

Design: This study was a cross-sectional comparison between obese and normal-weight children and a longitudinal 1-year follow-up study during lifestyle intervention in obese children.

Setting: The setting of the study was primary care.

Patients: Forty obese prepubertal (mean age 8.5 ± 2.1 years, 48% female, mean body mass index 24.8 ± 3.5 kg/m^2) and 40 normal-weight children matched for gender, age, and pubertal stage.

Intervention: The study consisted of an outpatient 1-year intervention program based on exercise, behavior, and nutrition therapy.

Main Outcomes Measures: Progesterone, 17-hydroxyprogesterone, 11-deoxycorticosterone, corticosterone, aldosterone, 11-deoxycortisol, cortisol, cortisone, dehydroepiandrosterone sulfate (DHEAS), androstenedione, T, dihydrotestosterone, insulin resistance index of the homeostasis model assessment, and blood pressure were measured.

Results: Prepubertal obese children showed significantly increased androgens (DHEAS, androstenedione, T), mineralocorticoid precursor corticosterone, and glucocorticoids (11-deoxycortisol, cortisol, cortisone) compared with normal-weight children. In contrast to 20 obese children without weight loss, the 20 obese children with substantial weight loss demonstrated a significant decrease of cortisol, cortisone, and corticosterone. Androstenedione and T decreased but DHEAS remained elevated. Changes of the homeostasis model assessment correlated significantly positively with changes of cortisol ($r = 0.38$) and cortisone ($r = 0.43$) in partial regression analyses adjusted to changes of weight status.

Conclusions: In obese prepubertal children, the increased androgens, mineralocorticoid precursors, and glucocorticoids were responsive to weight loss in contrast to DHEAS, suggesting that DHEAS does not seem to be regulated by changes in body mass index. (***J Clin Endocrinol Metab*** **98: E1022–E1030, 2013)**