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What Are Normal Cortisol Values for Young Children?

Aidan Rubio*

Kanwaljeet Anand, MBBS, D.Phil.[†]

Cynthia Rovnaghi, BA, BS, M.S.[‡]

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[†]Stanford University

[‡]Stanford University

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What Are Normal Cortisol Values for Young Children?*

Aidan Rubio; Kanwaljeet Anand, MBBS, D.Phil.; and Cynthia Rovnaghi, BA, BS, M.S

Abstract

Normative ranges for cortisol levels in children remain controversial, because of diurnal variations, effects of age, sex, stressful experiences before sampling (blood, saliva), intercurrent illnesses/immunizations, sample preparation and analytical methods. Measuring hair cortisol concentrations (HCC) is unaffected by diurnal variations or many of these factors, and presents a summative measure of chronic stress. Depending on hair growth rates, approximately 1 cm of hair represents cortisol release over the past month. HCC does not fluctuate frequently and therefore represents cumulative stress over time. It is vitally important to establish normative cortisol levels in children, so that both maladaptive and toxic stress levels can be measured.

Pilot data from children in the CANDLE Study (Conditions Affecting Neurocognitive Development & Learning in Early childhood) were analyzed to identify the 25th, 50th and 75th percentiles for HCC in 1-4 year-old children. Significantly higher HCC were noted in black vs. white children at 1, 2, 3, and 4-years ($P < 0.001$, for all ages). When measuring HCC we must also study the biochemical composition of an individual's hair, primarily its lipid content. This lipid content is significantly different depending on one's racial background and may account for some of the observed racial differences in HCC (Robbins, 2012). Establishing age-, sex-, and race-specific normative levels for HCC are essential for investigating the cumulative effects of chronic stress or "allostatic load" across the lifespan. If the normative ranges for HCC can be established, both the causes and effects of maladaptive and toxic stress can be subsequently identified, prevented and/or treated.

KEYWORDS: Hair Cortisol Content, Children, Lipid Content

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Kanwaljeet Anand, MBBS, D.Phil., Stanford University

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Coordinating Center: Stanford University

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