

# STRONG CHILDREN'S RESEARCH CENTER

## Summer 2013 Research Scholar

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### ABSTRACT

**Title:** Morning Blood Pressure Surge in Children Evaluated for Hypertension

**Background:** Sleep blood pressure (BP) is normally lower than wake BP, and BP increase physiologically upon awakening. This phenomenon is known as the morning surge. Exaggerated morning surge is thought to be the cause of the increased risk of cardiovascular events during the first 4-6 hours after wake in adult populations. In addition, an exaggerated morning surge (top decile) is an independent risk factor for cardiovascular events, and is correlated with an increased left ventricular mass index (LVMI). Despite that primary hypertension in children is emerging as a major public health concern; the morning surge has not been well studied in children.

**Objective:** To describe the morning blood pressure surge in children who are referred for the evaluation of elevated BP and to associations with exaggerated morning surge in children.

**Results:** The average preawakening SBP surge in the lower 90 percent was found to be 11.22 mm Hg, while the mean upper decile surge was 26 mm Hg. In contrast, the average sleep trough SBP surge in the lower 90 percent was 23.24, with the average sleep trough SBP surge in the top decile was 39 mm Hg. There was a positive correlation between exaggerated sleep trough SBP surge and sleep SBP variability ( $r = 0.27$ ,  $p < 0.001 = 0.0002$ ), and exaggerated sleep trough SBP surge and wake SBP load ( $r = 0.23$ ,  $p < 0.001$ ). Examining the demographics associated with morning surges, exaggerated preawakening SBP surge was found to be associated with gender ( $p = 0.037$ ) and BMI percentile ( $p = 0.009$ ). There were no found demographic associations with the sleep trough SBP morning surge.

**Conclusion:** It was found that the mean morning surge for children in the upper decile was remarkably similar to those of adults. Importantly, we found that the sleep trough method of determining the morning surge is far less confounded by BMI and gender than the preawakening method. This indicates that the sleep trough method of calculating morning surge may be more clinically useful than the preawakening method. Our observations found that both methods were associated with BP variability, which suggests that the exaggerated morning surges may be mechanistically influenced by dysregulation of the sympathetic nervous system.