
Elevated C Reactive Protein is Associated with Sleep-Disordered Breathing in an Adolescent Population

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Background: Sleep-disordered breathing (SDB) is associated with cardiovascular disease (CVD) in adults. This relationship is thought to be partly mediated by exposure to SDB-associated recurrent hypoxemia, which leads to oxidative stress and inflammation. Although the prevalence of obesity, a known risk factor for SDB, has increased “epidemically” in youth, little is known regarding the extent to which SDB may modify CVD risk factors in children. This analysis tests the hypothesis that high sensitivity C-reactive protein (CRP), a measure of inflammation and CVD risk, is associated with SDB in adolescents, and whether this relationship is independent of body mass index (BMI).

Methods: Ninety children between 12 and 18 years were selected from a sleep clinic (10%) and non-clinical population-based cohort (90%) to represent a range of SDB severity. An overnight sleep study was used to measure the apnea hypopnea index (AHI, number of obstructive apneas and hypopneas per sleep hour). Adolescents with an $AHI \geq 5$ were categorized as having SDB. Evening and morning-after CRP values were averaged.

Results: The sample was 47% male; 38% black; 33% obese ($BMI \geq 95^{th}$ %ile); and 17% at risk for overweight ($BMI 85^{th}$ - 95^{th} %ile). Sixteen percent of the sample had SDB, with AHI values ranging from 5.5 to 55 (median = 17.2). Median CRP was (0.065 mg/dL; range 0.01 – 1.76) with 25% of values above 0.2. BMI was significantly correlated with both AHI (Spearman $r = 0.42$, $p < .001$) and CRP ($r = 0.46$, $p < .001$). After using linear regression to adjust for BMI %ile, BMI %ile², sex, race, and age, log (CRP) was higher ($p = .006$) in adolescents with SDB {back transformed adjusted mean CRP = 0.18 (95%CI; 0.090-.36)} than in the no-SDB group {adjusted mean CRP = 0.06 (95%CI; 0.05 – 0.08)}.

Discussion: The increased levels of CRP in teens with even modest levels of SDB suggest that SDB may adversely influence their CVD risk profile. SDB may be one pathway by which obesity leads to an increased CVD risk in adolescents that persists into adulthood. Efforts to prevent, screen and treat SDB in childhood may favorably modify CVD risk profiles of adolescents.