Introduction

- Overweight/obesity and asthma are concurrent health epidemics and morbidities in the U.S. and worldwide (1-5).
- U.S. African American females (AAF) have poor asthma outcomes compared to other race and gender groups (6-8). Overweight/obesity was found to increase the risk for asthma in the “Black Women Health Study” (9), and was proposed as an important etiological factor contributing to asthma-related disparities in the U.S. (10-12).

Hypotheses

- Overweight/Obesity is significantly associated with self-reported asthma in AAF, independent of other risk factors.
- Short sleep duration and poor sleep quality (self-reported short habitual sleep time, self-perception of not getting enough sleep, insomnia) and obesity symptoms are significantly associated with asthmatic symptoms in AAF.
- Sleep duration and quality and obesity symptoms will not confound or modify the association between overweight/obesity and asthma in AAF.
- Sleep disturbances due to wheezing partially mediate the association of each sleep predictor with asthma, but the association between overweight/obesity and asthma in AAF.

Methods

Data Source and Participants

- 1,489 African American Females (AAF), 16 years of age and older.
- Questionnaires used: Demographic, Alcohol /drug use questionnaires, Current health, BMI.

Sleep Predictors

- Short habitual sleep time: “How much sleep do you usually get at night on weekdays or workdays?”, response of (< 5 hours/night).
- Insomnia: 2-1 sleep complaint and 2+ self-reported daytime functional impairment due to lack of sleep occurring ≥ 215 times/month.
- Self perception of sleep deprivation: “Lack of sleep” or “almost always” not getting enough sleep.
- Symptoms of sleep apnea: ≥ 5 night/week snoring or ≥ 3 night/week snoring/stop breathing in the past 12 months.

Predictor: Overweight/Obesity

- BMI ≥ 25 kg/m² (NIH Clinical Guidelines, 1998)

Outcome: Asthma status

- self-reported current asthma diagnosis by a physician

Statistical Analyses

- Weighted normed (standardized) to the size of the subsamples (AAF sample, and the AAF sample for non-white AAF samples).
- Proch Survey
- Taylor Series Linearization approach
- Nested hierarchical logistical regression modeling
- Current asthma diagnosis
- Overweight/obesity (primary exposure variable)
- Sleep variables (secondary exposure variables)
- Covariates: age, income, education, insurance, living arrangements, smoking, sedentary leisure time, exercise, self-reported general health, and depression.

Results

Asthma Risk According to Obesity and Sleep Factors

<table>
<thead>
<tr>
<th>Risk Factors of Asthma:</th>
<th>Age-Adjusted Odds Ratios† (95% CI)</th>
<th>Adjusted Odds Ratios‡ (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overweight/Obese</td>
<td>2.3 (1.6-3.3)**</td>
<td>2.0 (1.4-2.9)***</td>
</tr>
<tr>
<td>Short Habitual Sleep Time (&lt;5hrs)</td>
<td>2.5 (1.5-4.0)**</td>
<td>1.7 (1.1-2.8)*</td>
</tr>
<tr>
<td>Insomnia</td>
<td>2.0 (1.3-3.1)†</td>
<td>1.1 (0.7-1.7)</td>
</tr>
<tr>
<td>Sleep Apnea Symptoms</td>
<td>2.2 (1.6-3.0)**</td>
<td>1.7 (1.2-2.4)*</td>
</tr>
<tr>
<td>Self-Perception of Sleep Deprivation</td>
<td>2.1 (1.4-3.2)**</td>
<td>1.7 (1.1-2.7)*</td>
</tr>
</tbody>
</table>

† P<0.05  ** P<0.01  *** P<0.001
‡ Bivariate models adjusted for age.
§ Partially adjusted model including age, overweight/obesity, short habitual sleep time (<5hrs), insomnia, symptoms of sleep apnea, and self-perception of sleep deprivation

Discussion

- Different mechanisms in the asthma causal chain may explain the following findings:
  1. Overweight/obesity remains significantly associated with self-reported asthma in AAF, and sleep duration/quality/OSA symptoms does not confound or modify this relationship.
  2. Self-perception of sleep deprivation and OSA symptoms remain significantly associated with self-reported asthma in AAF in fully adjusted models, and overweight/obesity does not confound or modify this relationship.
  3. Sleep related conditions are significantly associated with overweight/obesity.

- Asthmatic AAF have significantly higher prevalence of self-reported poor sleep characteristics including habitual sleep time <5 hours, insomnia, sleep apnea symptoms, and self-perception of sleep deprivation compared to their non-asthmatic counterparts, suggesting that asthmatic AAF might benefit from management directed at sleep-related conditions and associated factors.

References