

Association Between Obesity and Obstructive Sleep Apnea Among Males Aged 20 Years and Older in the United States

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Introduction

- Obesity has risen to become a major healthcare priority in the US due to its association with cardiovascular and endocrine diseases, yet its effect on other chronic diseases has not been well studied. Studies have shown a correlation between Obstructive Sleep Apnea (OSA) and obesity, however, the strength of the correlation has not been previously modeled.

Objective

- The objective of this study is to utilize regression forecast modeling to examine the relationship between obesity and OSA.

Materials and Methods

- We included obese males aged 20 years and over. We define obese as anyone with a BMI of ≥ 30 . We excluded males younger than 20 years because OSA is less common in younger patients and not commonly diagnosed until adulthood.
- We studied the annual increase in obesity using data from the 1998-2008 National Health and Nutrition Examination Survey (NHANES) (3), a population-based, representative survey sample of the US non-institutionalized population. This obesity study consists of an at-home interview followed by a physical examination measuring weight and height. NHANES surveys are performed continually, with the highest number of surveys conducted in 2012.
- We conducted a review of the OSA literature to determine the prevalence of OSA in adult males in the US. We preferred studies with sleep laboratory-derived findings. However, we also accepted studies using previously validated OSA questionnaires. We found two studies providing OSA estimates for 1998 and 2006.
- Using NHANES data, we calculated a linear trend for the prevalence of obesity from 1998-2006 and applied this trend to the 1998 published OSA prevalence and forecasted the expected prevalence of OSA in 2006, with the assumption that the increase in obesity would drive a proportional increase in OSA. We then compared our forecasted OSA estimates to the 2006 published OSA prevalence study to determine the correlation between obesity and OSA.

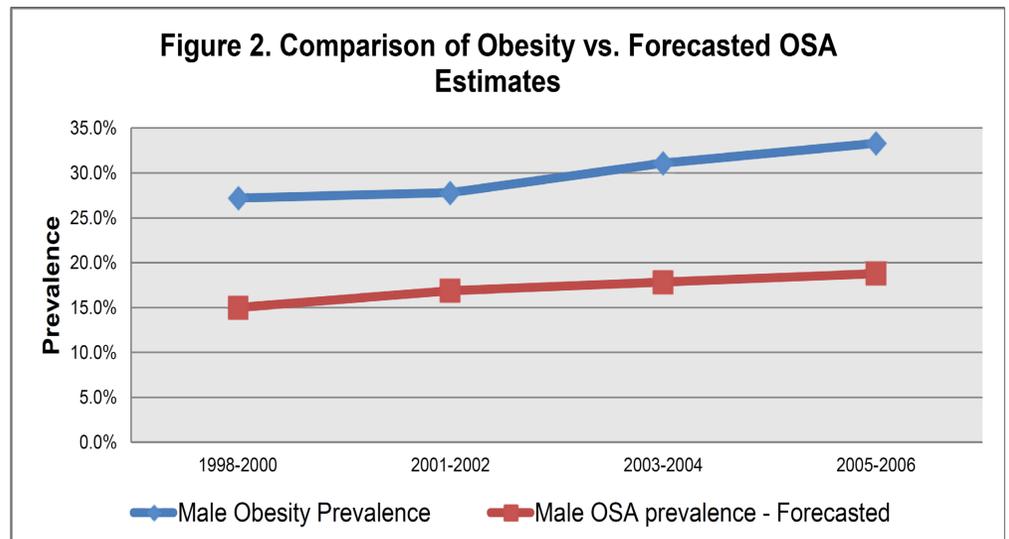
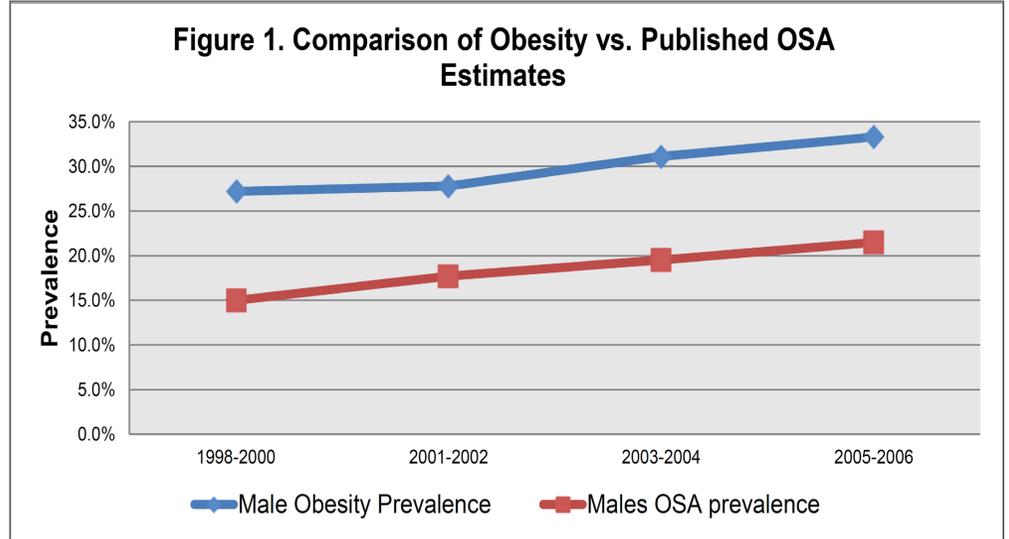


Table 1. Summary of OSA Forecasting

Year	Obesity NHANES Estimates	OSA estimates from Published Literature	Forecasted OSA Estimates Using Obesity Trend
1998-2000	27.5%	15.0%	15.0%
2001-2002	27.8%	17.7%	16.9%
2003-2004	31.1%	19.5%	17.8%
2005-2006	33.3%	21.5%	19.0%

Results

- We found two OSA studies that matched our disease definition and met our inclusion criteria. One study used data from a sleep laboratory study and provided the prevalence of OSA in adult males aged 20 years and over in 1998 (1), estimating it at 15%. The second study estimated the prevalence of OSA using the validated Berlin Questionnaire in 2006 (2). After adjusting for the sensitivity of the Berlin Questionnaire, which is 70%, the study's reported prevalence of OSA was 21.5% in 2006 (Figure 1).
- The NHANES obesity data showed that the prevalence of obesity increased from 27% to 33%, from 1998-2006, respectively, a 25% linear increase over 8 years. Applying a 25% linear trend to the 1998 published OSA estimates results in a forecasted 19% prevalence in 2006 for OSA for male adults with an apnea-hypopnea index (AHI) ≥ 5 , comparable to the 2006 published OSA prevalence estimate of 21.5% (Figure 2).

Conclusion

- By combining regression analysis with a forecasting model, we illustrated that the prevalence of OSA may be driven in part by obesity. This study further supports weight-related treatment modalities for OSA management, however, additional studies are needed to examine the effect reducing obesity may have on reversing the symptoms of OSA.

References

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