

Association of Sleep-Disordered Breathing with Erectile Dysfunction in Community-Dwelling Older Men



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INTRODUCTION

- Erectile dysfunction (ED) is common sexual health problem among older men.
- Sleep-disordered breathing (SDB), a disorder characterized by repeated cessation or reduction in airflow during sleep accompanied by hypoxia, is hypothesized to increase risk of ED.
- SDB and ED share common risk factors, but their association in older men is unclear.

OBJECTIVE

- To investigate the association between SDB and prevalent ED in older men.

METHODS

- Study design:** Cross-sectional analysis
- Study cohort:** Community-dwelling men aged ≥67 years who participated in the MrOS Sleep Study (sleep visit, 2003-2005) and returned for the second MrOS visit (visit 2, 2005-2006).
- Measurements:** Overnight polysomnography at the sleep visit and completed sexual health questionnaires at visit 2.
- Predictor:** SDB defined by apnea-hypopnea-index (AHI) or nocturnal hypoxemia (%total sleep time spent at <90% oxygen saturation, %time O₂<90)
- Outcome:** ED defined by Massachusetts Male Aging Study (MMAS) scale or, in sexually active men, the five-item International Index of Erectile Function questionnaire (IIEF-5).
- Statistical analysis:** Demographics and clinical characteristics were examined across levels of ED. Logistic regression was used to examine the association between SDB in 4 categories and odds of ED. We adjusted for age, clinical site, race, then used backward elimination to present a fully adjusted model.

RESULTS

- Of 2,676 men completing the MMAS, 1,870(70%) had moderate to complete ED.
- Of 1,099 sexually active men completing the IIEF-5, 282(26%) had moderate to severe ED.
- After adjusting for age, race, and site, greater SDB measured by AHI was associated with greater odds of MMAS-defined moderate to complete ED(OR=1.37; 95%CI: 0.99-1.9 for severe SDB vs none; p-trend=0.01).
- Further adjustment for BMI, socioeconomic status, heart disease, diabetes mellitus, hypertension, and

depression score attenuated the association between SDB measured by AHI and MMAS-defined ED (OR=1.07; 95%CI: 0.76-1.51 for severe SDB vs none; p trend=0.42).

- Higher AHI was not associated with greater odds of moderate to severe ED by IIEF-5(OR=1.37; 95%CI: 0.81-2.29 for severe SDB vs none; p-trend=0.69).
- Greater severity of nocturnal hypoxemia was associated with increased odds of MMAS-defined moderate to complete ED (OR=1.36; 95%CI:1.04-1.8; p for trend=0.0049). But, this associations was attenuated after adjusting for age and clinical site (OR=1.24; 95%CI:0.92-1.66; p for trend=0.053).

Table 1: Demographics and Clinical Characteristics of Participants by Categories of ED measured by MMAS

| | Not Impotent (N= 411) | Minimally Impotent (N= 395) | Moderately Impotent (N= 729) | Completely Impotent (N= 1,141) | P value |
|--|--------------------------|--------------------------------|---------------------------------|-----------------------------------|---------|
| Age, mean (SD) | 73.9(4.6) | 74.2(4.6) | 75.3 (5) | 78.1(5.4) | <.0001 |
| Caucasian, n(%) | 382 (93) | 354 (90) | 641 (88) | 1,056 (93) | 0.002 |
| BMI(kg/m ²), mean(SD) | 26.5(3.3) | 27.2(3.9) | 27.2(3.8) | 27.4 (3.8) | 0.011 |
| Marital Status: married vs. not married, n(%) | 345 (84) | 333 (84) | 618 (85) | 987 (86) | 0.494 |
| At least one current sexual partner, n(%) | 279 (78) | 306 (87) | 521 (84) | 622 (69) | <.0001 |
| Currently smoking, n(%) | 10 (2) | 8 (2) | 13 (2) | 20 (2) | 0.839 |
| ≥3 drinks per week, n(%) | 189 (65) | 158 (58) | 298 (62) | 451 (62) | 0.411 |
| College education, n(%) | 258 (63) | 229 (58) | 427 (59) | 613 (54) | 0.009 |
| Heart disease, n(%) | 87 (21) | 108 (27) | 240 (33) | 470 (41) | <.0001 |
| Diabetes mellitus, n(%) | 26 (6) | 32 (8) | 93 (13) | 197 (17) | <.0001 |
| Hypertension, n(%) | 157 (38) | 180 (46) | 376 (52) | 612 (54) | <.0001 |
| Excellent/very good health status, n(%) | 385 (94) | 354 (90) | 643 (88) | 945 (83) | <.0001 |
| PASE score, mean(SD) | 164.4(73.1) | 156.7(74.3) | 152.9 (68.1) | 133.9(69.6) | <.0001 |
| Geriatric Depression Scale(0-15),mean(SD) | 1.1(1.7) | 1.4 (2) | 1.7 (2.1) | 2.1 (2.3) | <.0001 |
| Prostate Symptom Score (AUA Score),mean(SD) | 6.9 (5.5) | 7.9 (5.6) | 9.3(6.3) | 9.8 (6.8) | <.0001 |
| Bioavailable testosterone (ng/dl), mean(SD) | 229(70.9) | 214 (54.7) | 222.4(70.4) | 198.3(73.4) | <.0001 |
| Apnea-hypopnea index, median(IQR) | 6.8(2.2-14) | 6.1(2.1-13.9) | 7.6(3-15.5) | 7.6(2.8-17.4) | 0.001 |
| Nocturnal hypoxia (%time O ₂ <90), median (IQR) | 0.5(0-2.8) | 0.3(0-3) | 1(0-3) | 1(0-4) | 0.004 |

Table 2: The Association between SDB measured by Apnea-Hypopnea Index and ED measured by MMAS

| Regression Models | Odds Ratio(95%CI) by Severity of SDB | | | | P for trend |
|---|--------------------------------------|-----------------|------------------|-----------------|-------------|
| | Normal (n=1,054) | Mild (n=926) | Moderate (n=436) | Severe (n=260) | |
| Unadjusted | 1.0(referent) | 1.12(0.93-1.36) | 1.37(1.07-1.76) | 1.57(1.15-2.14) | 0.0007 |
| Adjusted for age and clinical site | 1.0(referent) | 1.14(0.93-1.39) | 1.36(1.05-1.76) | 1.39(1-1.92) | 0.0076 |
| Adjusted for age, clinic site, and race | 1.0(referent) | 1.14(0.93-1.39) | 1.34(1.03-1.73) | 1.37(0.99-1.9) | 0.0113 |
| Full model ¹ | 1.0(referent) | 1.09(0.89-1.34) | 1.14(0.87-1.5) | 1.07(0.76-1.51) | 0.4215 |

¹Adjusted for age, study site, body-mass index (BMI), socioeconomic status, heart disease, diabetes mellitus, hypertension, and geriatric depression score

LIMITATIONS

- A temporal relationship between SDB and ED cannot be determined due to the cross-sectional nature of the analysis.
- Although in the final adjusted model we included clinically relevant factors with statistically significant association with both SDB and ED, there is potential for overadjustment for factors (e.g. heart disease) that may be on the causal pathway.
- The generalizability of the findings to other populations is unclear since the study population are mostly Caucasians.

CONCLUSION

- SDB increased the odds of ED in older men. However, this association was explained by confounding factors including BMI, heart disease, diabetes mellitus, hypertension, geriatric depression score, and socioeconomic status.
- Future studies should investigate the association between SDB and incident ED, and the role of aforementioned factors in this pathway.

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