

# The Role of Sleep Apnea in APOE-Alzheimer's Disease Pathway

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## Background

APOE genotype may be the most important genetic risk factor for Late Onset Alzheimer's disease.

Observational studies have assessed the association between sleep apnea and development of dementia. Two cohort studies showed a higher risk of dementia for people with SDB in U.S. female, and Taiwanese population, respectively.

However, the exact relationship between APOE genotype, sleep, and AD is not clear.

Thus, the goal of this project was: 1) to extract the available data from data biorepository at Vanderbilt university BioVu; 2) to examine the relationships among sleep, APOE, and dementia. If allowed .

In this study, we presented the available data in BioVu and conducted the descriptive analysis for the available data.

## Methods

- Algorithm was developed to identify patients who were diagnosed as Sleep apnea between 01/01/ 2003 and 12/31/2011 first, then non-sleep apnea controls were identified.
  - Vanderbilt University
- Participants
  - Both (SA+) & (SA-) subjects were identified by matching age and sex
- The data was analyzed using Chi-square and Two sample t tests
  - categorical variables
  - continuous variables

Figure 1. The sleep apnea

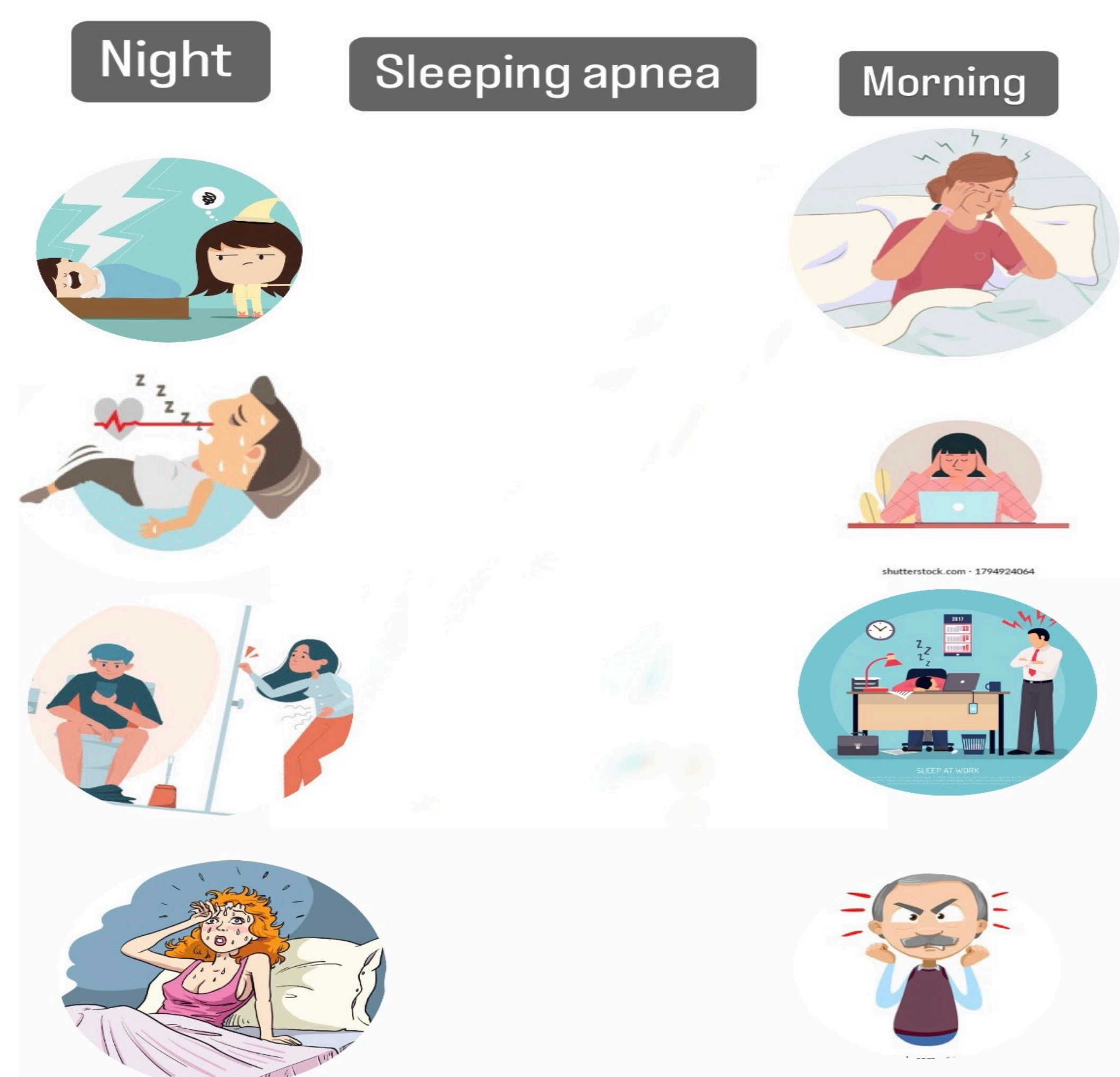
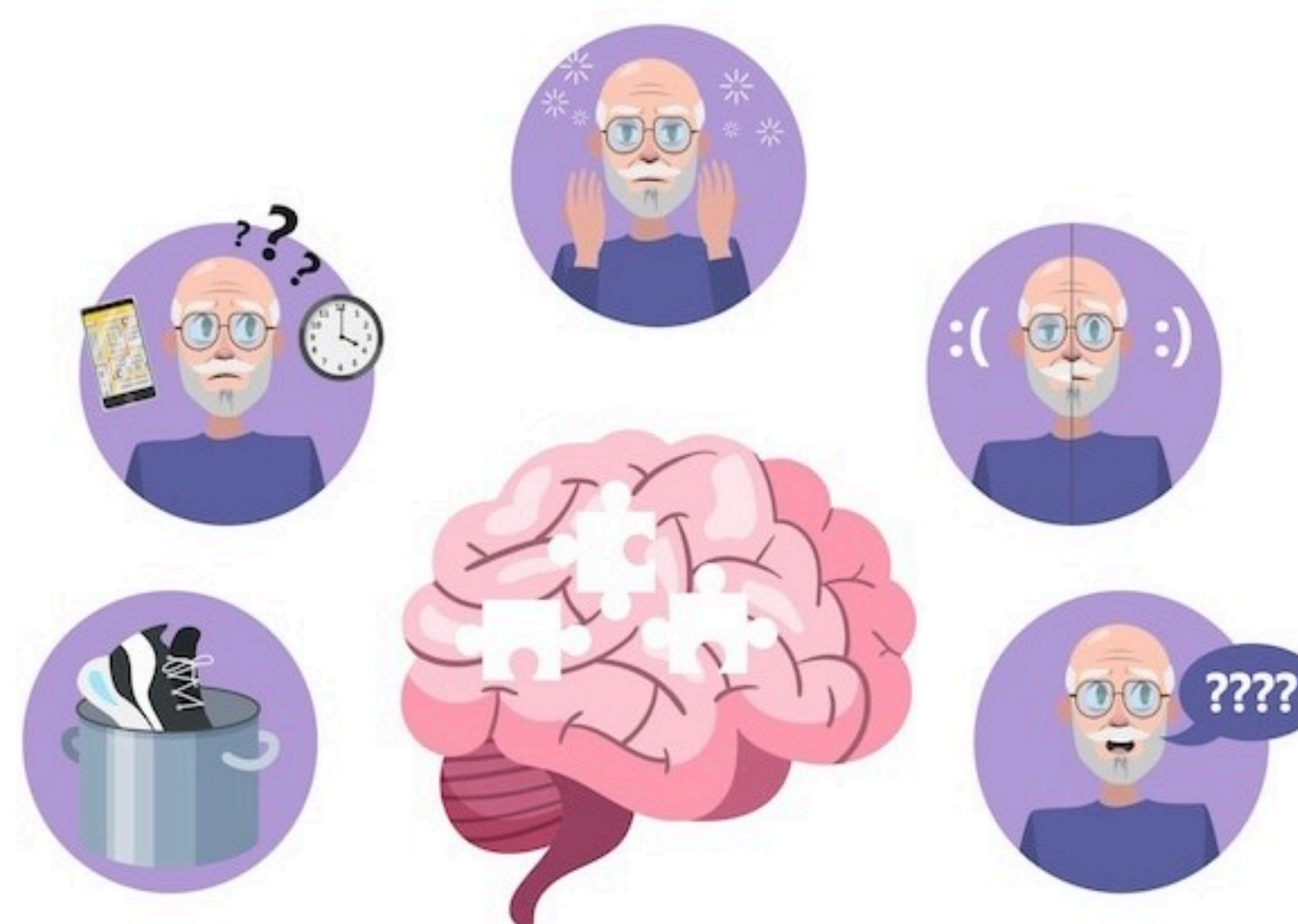


Figure 2. Dementia



(Sources: "Premium Vector: Alzheimer Disease Symptoms Infographic. Memory Loss and Problem." Freepik, 9 Sept. 2020. )

Table 1. General Characteristics of study sample

Variables	Participants
Age, years	53.83±11.81
BMI, kg/m <sup>2</sup>	31.76±6.85
Male, n(%)	26(34.21)
Race	
Asian, n (%)	1(1.32)
African American, n (%)	22(28.95)
Caucasian American, n (%)	53(69.74)
Ethnicity	
Non-Hispanic, n(%)	76(100)

## Results

- Total 48 matched subjects were identified:
  - 24 (SA+)
  - 24 (SA-)
- The average age is 53.3 years with a standard deviation of 11.8.
- Average BMI at 31.8 kg/m<sup>2</sup> with standard deviation of 6.8 kg/m<sup>2</sup>. SA subjects are heavier than the non-SAS subjects (p =0.00082)
- Total of 12 (25%) participants had passed away
  - 8 among SA- subjects
  - 4 among SA+ subjects with (p = 0.046)
- Developed dementia
  - 2 subjects developed dementia for SA- subjects
  - 0 subjects developed dementia for SA+ (p= 0.49)

Table 2. General Characteristics of study sample by Sleep Apnea Status

Variables	SA	Non-SA	P value *
Age, years	54.00 ±11.81	52.67±12.04	0.70
BMI, kg/m <sup>2</sup>	34.32±6.73	29.21±6.07	0.00082
Male, n(%)	13(34.21)	13(34.21)	
Death, n(%)	4(10.53)	8(21.05)	0.046

\*p values for categorical variable were from Chi-square test statistics or p values for continuous variables were from two sample T test.

## Conclusion

- The Vanderbilt BioVu database did not have enough samples to answer the research question.
- Due to the small sample size, the relationship between APOE and sleep apnea was not investigated. As a result, further research is required.
- In the future, data requests will be made through the national Alzheimer's coordinating center. (NACC).

## References:

- Yaffe, K., et al., Sleep-disordered breathing, hypoxia, and risk of mild cognitive impairment and dementia in older women. *Jama*, 2011. **306**(6): p. 613-9.
- Chang, W.P., et al., Sleep apnea and the risk of dementia: a population-based 5-year follow-up study in Taiwan. *PLoS One*, 2013. **8**(10): p. e78655.