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## OBJECTIVE

To study the risk of sleep disordered breathing (SDB) and its association with excessive sleepiness (ES) in Veterans with Parkinson's disease (PD).

## BACKGROUND

Excessive daytime sleepiness (ES) is a common disabling symptom of PD. The etiology is incompletely understood and is likely multifactorial. The relationship of ES with the clinical risk of sleep disordered breathing has not been clearly defined in this patient population.

## METHODS

One hundred and ten consecutive subjects with PD were assessed regarding subjective sleepiness, parkinsonism and depression using Epworth Sleepiness Scale (ESS), Unified Parkinson's Disease Rating Scale (UPDRS) and Zung Self Rating Depression scale (ZDS), respectively. The risk for SDB was assessed using a modified Berlin Questionnaire. SDB risk was compared between the "Sleepy" (ESS  $\geq 10$ ) and "Non-Sleepy" (ESS  $< 10$ ) subjects.

## RESULTS

Overall, 68 Parkinson's disease subjects (61.8 %) were at high risk for SDB.

### Sleepiness:

68 subjects (61.8%) had ESS  $\geq 10$  (mean 14.06, range 10-24) and were termed "Sleepy"

42 subjects (38.2%) with ESS  $< 10$  (mean 6.35, range 1-9) were termed "Non-Sleepy"

### Sleep Disordered Breathing:

47 Sleepy subjects (69.1%) were high risk for SDB (ESS mean 15.3)

21 Non-Sleepy subjects (50.0%) were high risk for SDB (ESS mean 3.76)

### Depression:

10 subjects (9.1%) were depressed, (ZDS score 50-61, mean 54)

All ten (100%) were in the Sleepy group (ESS 12-24, mean 16.5) and were high risk for SDB

There was no statistically significant difference between motor disease severity and demographic features between those with high or low risk of SDB.

Table 1: Demographic distribution of study subjects

| Demographics              | N (All)           | Sleepy            | Non-Sleepy        |
|---------------------------|-------------------|-------------------|-------------------|
| Gender                    |                   |                   |                   |
| Men                       | 107 (97.3%)       | 66 (97.1%)        | 41 (97.6%)        |
| Women                     | 3 (2.7%)          | 2 (2.9%)          | 1 (2.4%)          |
| Total                     | 110 (100%)        | 68 (100%)         | 42 (100%)         |
| Ethnicity                 |                   |                   |                   |
| White                     | 93 (84.5%)        | 58 (85.3%)        | 35 (83.3%)        |
| Black                     | 11 (10.0%)        | 7 (10.3%)         | 4 (9.5%)          |
| Hispanic                  | 6 (5.5%)          | 3 (4.4%)          | 3 (7.1%)          |
| Total                     | 110 (100%)        | 68 (100%)         | 42 (100%)         |
| Age at mid 2010 (std dev) | 71.8 (10.0)       | 71.3 (10.5)       | 72.8 (9.4)        |
| <b>Risk for SDB</b>       | <b>68 (61.8%)</b> | <b>47 (69.1%)</b> | <b>21 (50.0%)</b> |

Table 3: Chi-square analysis for comparison of Sleep Disordered Breathing among the Sleepy and Non-Sleepy participants

|            | SDB Risk | No SDB Risk | Total |
|------------|----------|-------------|-------|
| Sleepy     | 47       | 21          | 68    |
| Non-Sleepy | 21       | 21          | 42    |
| Total      | 68       | 42          | 110   |

Chi-square=4.02, p-value=0.045

Figure 1: Percentage of sleep disordered breathing risk in the Sleepy and Non-Sleepy groups

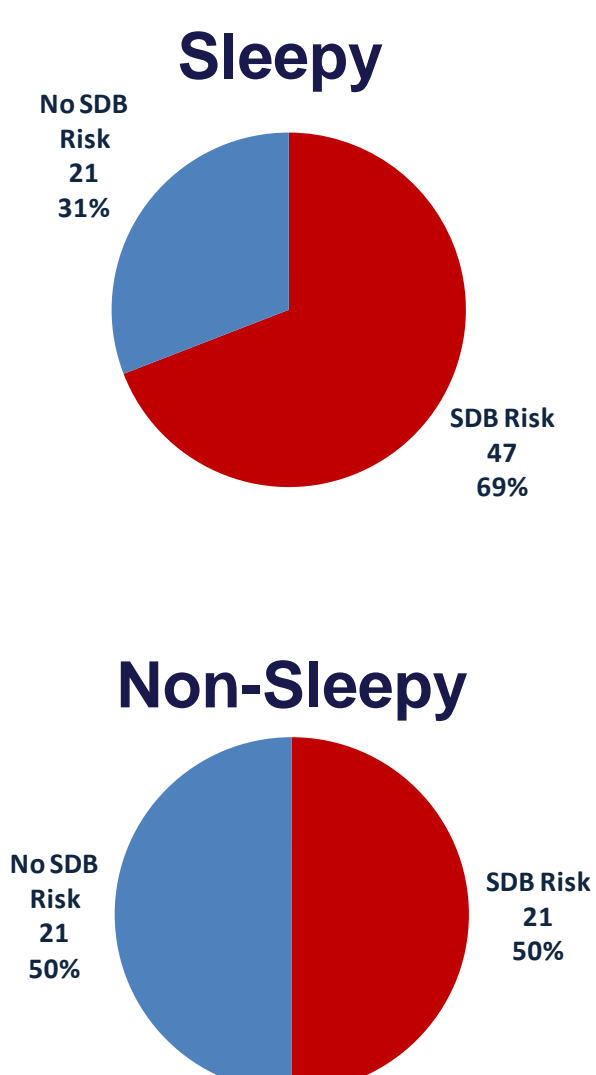


Table 2: Subset of 5 questions from Brief Sleep Symptom Checklist, a modification of the Berlin Questionnaire

Comparison of the percentage of subjects with positive answers to each question

| Questions:                                       | Category* | Sleepy | Non-Sleepy |
|--|-----------|--------|------------|
| I snore loudly                                   | 1         | 83.8%  | 71.4%      |
| I awaken gasping or choking for breath           | 1         | 32.4%  | 19.0%      |
| I awaken in the morning unrefreshed              | 2         | 75.0%  | 73.8%      |
| I fall asleep while driving                      | 2         | 20.6%  | 7.1%       |
| I've been told that I stop breathing in my sleep | 1         | 32.4%  | 11.9%      |

\*per Berlin questionnaire

## CONCLUSION

Veterans with Parkinson's disease irrespective of their level of daytime sleepiness are at high risk for sleep disordered breathing. The risk is significantly higher in those with excessive daytime sleepiness. There seems to be an association between depression, excessive sleepiness and sleep disordered breathing in this group of subjects. Further studies are warranted to better understand this association.