Sleep Apnea Risk Among Mexican American and Non-Hispanic White Stroke Survivors

Lesli E. Skolarus, MD; Lynda D. Lisabeth, PhD; Lewis B. Morgenstern, MD; William Burgin, MD; Devin L. Brown, MD

Background and Purpose—Sleep apnea is a modifiable independent stroke risk factor and is associated with poor stroke outcomes. Mexican Americans have a higher incidence of stroke than non-Hispanic whites. In a biethnic community, we sought to determine the frequency of screening, testing, and treatment of sleep apnea among stroke survivors and to compare self-perceived risk of sleep apnea with actual risk.

Methods—A survey was mailed to ischemic stroke survivors in the Brain Attack Surveillance in Corpus Christi (BASIC) project. The survey included the validated sleep apnea screening tool, the Berlin questionnaire, and queried the frequency of sleep apnea screening by symptoms, formal sleep testing, and treatment. Self-perceived risk and actual high risk of sleep apnea were compared using McNemar’s test.

Results—Of the 193 respondents (49% response rate), 54% were Mexican American. Forty-eight percent of respondents had a high risk of sleep apnea based on the Berlin questionnaire, whereas only 19% thought they were likely to have sleep apnea ($P<0.01$). There was no difference in the proportion of respondents at high risk of sleep apnea between Mexican Americans and non-Hispanic whites (48% versus 51%, $P=0.73$). Less than 20% of respondents had undergone sleep apnea screening, testing, or treatment.

Conclusions—Stroke survivors perceive their risk of sleep apnea to be lower than their actual risk. Despite a significant proportion of both Mexican American and non-Hispanic white stroke survivors at high risk of sleep apnea, few undergo symptom screening, testing, or treatment. Both stroke survivors and physicians may benefit from educational interventions. (Stroke. 2012;43:1143-1145.)

Key Words: cerebrovascular accident • Mexican American • sleep apnea

Poststroke sleep apnea (SA) is common with a prevalence of >50%.1 SA is an independent stroke risk factor and is associated with poor stroke outcomes.2,3 SA could be particularly important among Mexican Americans (MAs) who have an increased risk of stroke compared with non-Hispanic whites (NHWs).4 Among stroke survivors with SA, use of continuous positive airway pressure may improve functional outcomes and reduce depressive symptoms, although definitive studies are lacking.5 Research into poststroke SA treatment has been compromised by poor enrollment and high continuous positive airway pressure noncompliance.5 An underestimated self-perceived risk of SA and underappreciation for the medical importance of SA among stroke survivors could contribute to these challenges. To explore this question further, to compare ethnic differences with respect to SA, and to assess the frequency of screening, testing, and treatment for SA, we conducted a survey in a biethnic population of stroke survivors.

Methods

The Brain Attack Surveillance in Corpus Christi (BASIC) project is a population-based stroke surveillance study in the biethnic community of Nueces County, TX.4 All validated ischemic stroke cases interviewed as part of BASIC between November 2007 and June 2010 were invited to complete a postal survey in English or Spanish (n=431). Four cycles of mailings were conducted consisting of an introductory letter, survey, $2$ incentive, and a reminder/thank you postcard. A second survey was mailed approximately 1 month later to nonresponders. Demographics and stroke risk factor information obtained at the time of the stroke hospitalization from the medical record were ascertained from BASIC.

Survey

The validated Berlin questionnaire, which asks about snoring and apneas (Category 1), sleepiness (Category 2), and hypertension, height, and weight (Category 3), was used to assess high risk of SA, defined as a positive score in ≥2 categories.6 Respondents were also asked about smoking status and tonsillectomy history. Additional questions investigated whether respondents had been screened for SA by symptoms (snoring or daytime sleepiness) or formal polysomnography and also asked about positive airway pressure prescription and use, and surgical SA treatments. To assess self-perceived risk of SA, patients were asked “How likely do you think you are to have sleep apnea?” Responses were dichotomized into likely (very likely and quite likely) and not likely (somewhat, a little, and not at all likely). Patients were also asked “How important do you think

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sleep apnea is to overall health?” Responses were dichotomized into important (very important and quite a bit) and not important (somewhat, a little, and not at all important). The study was approved by the Institutional Review Boards of the University of Michigan and the Nueces County hospital systems.

Statistical Analysis
Descriptive statistics were used to assess survey responses overall and by ethnicity, and comparisons were made by ethnicity using Wilcoxon rank-sum tests and χ² tests. Respondents’ self-perception of SA risk was compared with their actual risk based on the Berlin questionnaire using a McNemar’s test.

Results
Two hundred eighteen (49%) respondents returned the survey with no ethnic differences in response rates. Fifteen respondents were excluded based on inability to determine a score for any of the 3 Berlin questionnaire categories due to missing data. Of the 193 remaining respondents, 54% were MAs (Table 1). The median age was 67 (interquartile range, 56–77) and 53% were female.

Based on the Berlin questionnaire, 48% of the respondents were at high risk for SA, whereas 19% thought they were likely to have SA (P<0.01). Only 26% of respondents reported being asked at least 1 SA symptom screening question by a healthcare provider (Table 2). The majority (66%) of respondents felt SA was important to overall health (Table 2).

Ethnic Comparisons
Differences in demographics and vascular risk factors were noted between MAs and NHWs (Table 1). No ethnic differences were found in the proportion of respondents at high risk of SA, who thought SA was important to overall health, or in screening, testing, or treatment of SA (Table 2). MA respondents had a greater self-perceived risk of SA than NHWs (25% versus 12% for high risk, P<0.04). Both MAs and NHWs had a higher actual risk of SA than their self-perceived risk of SA (P<0.01).

Discussion
The results of the postal survey suggest that ischemic stroke survivors have a higher actual risk of SA (50%) than their self-perceived risk (20%). Clinicians and researchers should be aware of this when offering diagnostic polysomnography or enrollment into a sleep apnea-related clinical trial, which may be otherwise rejected due to low self-perceived risk. Overall no ethnic differences were observed between MA and NHW stroke survivors with the exception of greater self-perceived risk of SA among MAs.

Several limitations warrant discussion. These results are based on self-report, which may be inaccurate. The risk of SA

<table>
<thead>
<tr>
<th>Race/ethnicity</th>
<th>All Respondents</th>
<th>Non-Hispanic White</th>
<th>Mexican American</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>NHWs</td>
<td>79 (41)</td>
<td>NA</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>MAs</td>
<td>104 (54)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blacks</td>
<td>9 (5)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>1 (0.5)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age, median y (IQR)</td>
<td>67 (56–77)</td>
<td>71 (60–79)</td>
<td>64.5 (54–73.5)</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Female</td>
<td>102 (53)</td>
<td>41 (52)</td>
<td>56 (54)</td>
<td>0.79</td>
</tr>
<tr>
<td>National Institutes of Health Stroke Scale score, median (IQR)</td>
<td>4 (2–7)</td>
<td>4 (1–8)</td>
<td>4 (2–6.5)</td>
<td>0.80</td>
</tr>
<tr>
<td>Insurance</td>
<td>159 (82)</td>
<td>73 (92)</td>
<td>78 (75)</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Hypertension</td>
<td>146 (76)†</td>
<td>54 (69)*</td>
<td>83 (81)*</td>
<td>0.11</td>
</tr>
<tr>
<td>Atrial fibrillation</td>
<td>26 (13)</td>
<td>19 (24)</td>
<td>6 (6)</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Coronary artery disease</td>
<td>51 (26)</td>
<td>23 (29)</td>
<td>24 (23)</td>
<td>0.36</td>
</tr>
<tr>
<td>Diabetes</td>
<td>83 (43)</td>
<td>22 (28)</td>
<td>58 (56)</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>High cholesterol</td>
<td>99 (51)</td>
<td>43 (54)</td>
<td>51 (49)</td>
<td>0.47</td>
</tr>
<tr>
<td>History of stroke</td>
<td>54 (28)</td>
<td>26 (33)</td>
<td>27 (26)</td>
<td>0.31</td>
</tr>
<tr>
<td>Current smoker</td>
<td>42 (22)</td>
<td>17 (22)</td>
<td>23 (22)</td>
<td>0.92</td>
</tr>
<tr>
<td>History of excessive alcohol use</td>
<td>13 (7)</td>
<td>4 (5)</td>
<td>9 (9)</td>
<td>0.35</td>
</tr>
<tr>
<td>Body mass index, median kg/m² (IQR)</td>
<td>27 (25–32)§</td>
<td>26 (24–30)‡</td>
<td>28 (26–33)*</td>
<td>0.02</td>
</tr>
<tr>
<td>Tonsillectomy</td>
<td>63 (33)†</td>
<td>43 (56)†</td>
<td>19 (18)</td>
<td>&lt;0.01</td>
</tr>
</tbody>
</table>

NHWs indicates non-Hispanic whites; MAs, Mexican Americans; IQR, interquartile range; NA, not applicable.

*One missing.
†Two missing.
‡Three missing.
§Four missing.
was identified using the Berlin questionnaire and not the gold standard, polysomnography. We do not have stroke subtype information available; however, conflicting data exist regarding the relationship between SA and stroke subtype. Some studies have shown that macroangiopathy may be more associated with sleep apnea than other subtypes. Nonetheless, stroke subtype does not differ by ethnicity in the Corpus Christi community. Finally, despite an adequate survey response rate of 49% and the absence of ethnic differences in survey response rate, sampling error may still be present. Further work exploring ethnic differences in SA with respect to disparities in stroke incidence and outcome is ongoing.

Consistent with the lack of awareness of SA within the general population, despite the high prevalence of MA and NHW stroke survivors at high risk of SA, few acknowledge a high risk of SA or have been screened, tested, or treated for SA. Therefore, both stroke survivors and physicians may benefit from educational interventions about the high prevalence of and negative outcomes associated with SA in general, although more research is needed to establish the benefits of SA treatment on stroke-related outcomes.

Sources of Funding
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Table 2. Screening and Testing of Sleep Apnea by Healthcare Provider, Treatment of Sleep Apnea, Perceptions of Sleep Apnea, and Berlin Questionnaire Scores Reported by Stroke Survivors in the Brain Attack Surveillance in Corpus Christi (BASIC) Project

<table>
<thead>
<tr>
<th></th>
<th>All Respondents (n=193)</th>
<th>Non-Hispanic White (n=79)</th>
<th>Mexican American (n=104)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asked about snoring</td>
<td>36 (19)*</td>
<td>18 (23)*</td>
<td>17 (16)</td>
<td>0.25</td>
</tr>
<tr>
<td>Asked about daytime sleepiness</td>
<td>35 (18)*</td>
<td>16 (20)</td>
<td>18 (17)*</td>
<td>0.63</td>
</tr>
<tr>
<td>Discussed undergoing polysomnography</td>
<td>29 (15)*</td>
<td>13 (16)</td>
<td>16 (16)*</td>
<td>0.87</td>
</tr>
<tr>
<td>Underwent polysomnography†</td>
<td>26 (14)*</td>
<td>11 (14)</td>
<td>15 (15)*</td>
<td>0.45</td>
</tr>
<tr>
<td>Diagnosed with sleep apnea</td>
<td>17 (9)†</td>
<td>9 (12)‡</td>
<td>8 (8)†</td>
<td>0.39</td>
</tr>
<tr>
<td>Treated for sleep apnea with positive airway pressure</td>
<td>8 (4)§</td>
<td>4 (5)‡</td>
<td>4 (4)*</td>
<td>0.67</td>
</tr>
<tr>
<td>Treated for sleep apnea by surgical or laser procedure</td>
<td>2 (1)‖</td>
<td>0 (0)‡</td>
<td>2 (2)‡</td>
<td>0.22</td>
</tr>
<tr>
<td>Thought sleep apnea was important to health</td>
<td>120 (66)‡‡</td>
<td>45 (62)**</td>
<td>70 (71)¶</td>
<td>0.21</td>
</tr>
<tr>
<td>Self-perception: likely to have sleep apnea</td>
<td>36 (19)††</td>
<td>9 (12)¶</td>
<td>25 (25)‡</td>
<td>0.04</td>
</tr>
<tr>
<td>Positive Berlin questionnaire score</td>
<td>92 (48)†‡</td>
<td>40 (51)</td>
<td>50 (48)</td>
<td>0.73</td>
</tr>
</tbody>
</table>

*One missing.
†Before or after the stroke.
‡Two missing.
§Three missing.
¶Four missing.
‖Five missing.
**Six missing.
††Eight missing.
‡‡Twelve missing.

Disclosures
None.

References
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