Sleep apnea risk among Mexican American and non-Hispanic white stroke survivors

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Abstract

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, while only 19% thought they were likely to have sleep apnea (p<0.01). There was no difference in proportion of respondents at high risk of sleep apnea between Mexican Americans and non-Hispanic whites (48% vs. 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.

Keywords

Stroke; sleep apnea; Mexican Americans

Post-stroke sleep apnea (SA) is common with a prevalence of over 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 to non-Hispanic whites (NHWs).[4] Among stroke survivors with SA, use of continuous positive airway pressure (CPAP) may improve functional outcomes and reduce

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depressive symptoms, although definitive studies are lacking.[5] Research into post-stroke SA treatment has been compromised by poor enrollment and high CPAP non-compliance.[5] An underestimated self-perceived risk of SA and under-appreciation 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, Texas.[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 one month later to non-responders. 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),[6] was used to assess high risk of SA, defined as a positive score in two or more categories.[6, 8] Respondents were also asked about smoking status and tonsillectomy history. Additional questions investigated whether respondents had been screened for SA via symptoms (snoring or daytime sleepiness) or formal polysomnography, and also asked about positive airway pressure (PAP) 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 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 χ^2 tests. Respondents' self-perception of SA risk was compared to 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 three Berlin questionnaire categories due to missing data. Of the 193 remaining respondents, 54% were MAs (table 1). The median age was 67 (interquartile range (IQR) 56–77) and 53% were female.

Based on the Berlin questionnaire, 48% of the respondents were at high risk for SA while 19% thought they were likely to have SA (p<0.01). Only 26% of respondents reported being

asked at least one SA symptom screening question by a health care 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% vs. 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 was identified using the Berlin Questionnaire and not the gold standard, polysomnography.[6] We do not have stroke subtype information available; however conflicting data exist regarding the relationship between sleep apnea and stroke subtype. Some studies have shown that macroangiopathy may be more associated with sleep apnea than other subtypes.[7] Nonetheless, stroke subtype does not differ by ethnicity in the Corpus Christi community.[8] 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 sleep apnea with respect to disparities in stroke incidence and outcome is ongoing.

Consistent with the lack of awareness of sleep apnea 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.[9] 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.

Acknowledgments

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Table 1

Sociodemographics and stroke risk factors among stroke survivors in the BASIC Project.

	All Respondents n=193 n (%)	non-Hispanic white n=79 n (%)	Mexican American n=104 n (%)	P value
Race/Ethnicity		NA	NA	
NHWs	79 (41)			
MAs	104 (54)			
African Americans	9 (5)			
Other	1 (0.5)			
Age (median(IQR))	67 (56–77)	71 (60–79)	64.5 (54–73.5)	<0.01
Female	102 (53)	41 (52)	56 (54)	0.79
NIH score (median(IQR))	4 (2–7)	4 (1–8)	4 (2–6.5)	0.80
Insurance	159 (82)	73 (92)	78 (75)	<0.01
Hypertension	146 (76)[b]	54 (69)[a]	83 (81)[a]	0.11
Atrial Fibrillation	26 (13)	19 (24)	6 (6)	<0.01
Coronary Artery Disease	51 (26)	23 (29)	24 (23)	0.36
Diabetes	83 (43)	22 (28)	58 (56)	<0.01
High Cholesterol	99 (51)	43 (54)	51 (49)	0.47
History of stroke	54 (28)	26 (33)	27 (26)	0.31
Current Smoker	42 (22)	17 (22)	23 (22)	0.92
History of excessive alcohol use	13 (7)	4 (5)	9 (9)	0.35
BMI (median(IQR))	27 (25–32)[d]	26 (24–30)[c]	28 (26–33)[a]	0.02
Tonsillectomy	63 (33)[b]	43 (56)[b]	19 (18)	<0.01

[a] One missing,

[b] two missing,

[c] three missing,

[d] four missing

Table 2

Screening and testing of sleep apnea by health care provider, treatment of sleep apnea, perceptions of sleep apnea, and berlin questionnaire scores reported by stroke survivors in the BASIC Project.

	All Respondents n=193 agreement n(%)	non-Hispanic white n=79 agreement n(%)	Mexican American n=104 agreement n(%)	P value
Asked about snoring	36 (19)[a]	18 (23)[a]	17 (16)	0.25
Asked about daytime sleepiness	35 (18)[a]	16 (20)	18 (17)[a]	0.63
Discussed undergoing polysomnography	29 (15)[a]	13 (16)	16 (16)[a]	0.87
Underwent polysomnography [b]	26 (14)[a]	11 (14)	15 (15)[a]	0.45
Diagnosed with sleep apnea	17 (9)[e]	9 (12)[c]	8 (8)[c]	0.39
Treated for sleep apnea with PAP	8 (4)[d]	4 (5)[c]	4 (4)[a]	0.67
Treated for sleep apnea by surgical or laser procedure	2(1)[e]	0(0)[c]	2(2)[c]	0.22
Thought sleep apnea was important to health	120 (66)[i]	45 (62)[g]	70 (71)[f]	0.21
Self-perception: likely to have sleep apnea	36 (19)[h]	9 (12)[f]	25 (25)[c]	0.04
Positive Berlin Questionnaire score	92 (48)	40 (51)	50 (48)	0.73

[a] one missing,

[b] before or after the stroke,

[c] two missing,

[d] three missing,

[e] four missing,

[f] five missing,

[g] six missing,

[h] eight missing,

[i] twelve missing