



Original Article

Risk of sleep apnea in orchestra members

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ABSTRACT

Background: Obstructive sleep apnea (OSA) is a common condition with substantial health consequences. A recent randomized trial found that playing the didgeridoo improved both subjective and objective sleep measures. We undertook a cross-sectional survey of professional orchestra players to test the hypothesis that playing a wind instrument would be associated with a lower risk of OSA.

Methods: An anonymous internet-based survey of professional orchestra members assessed risk of sleep apnea using the Berlin questionnaire. Multivariable logistic regression was used to test the association between playing a wind instrument and having a high risk score on the Berlin questionnaire, both unadjusted and adjusted for age, body mass index, and gender.

Results: A total of 1,111 orchestra members responded, including 369 (33%) wind instrument players. Wind players were more often male and had a higher body mass index than non-wind players. Of all musicians, 348 (31%) had a high risk of sleep apnea. Wind players were more likely than non-wind players to be at high risk in unadjusted analysis (Odds ratio = 1.47, 95% CI 1.13, 1.91), though this association was not significant in adjusted analysis (Odds ratio = 1.12 (0.82, 1.54)).

Conclusion: Playing a wind instrument was not associated with a lower risk of OSA.

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1. Introduction

Obstructive sleep apnea (OSA) is an important medical condition that predisposes patients to cerebrovascular and cardiovascular disease [1–3]. Although the standard treatment is continuous positive airway pressure, compliance is often poor, suggesting the need for alternative therapies [4]. Recently, a randomized trial showed that playing the didgeridoo, a wind instrument of the indigenous Australians, was associated with a reduction in sleep-disordered breathing events and daytime sleepiness [5]. Playing the didgeridoo requires the use of circular breathing, a technique used to produce a continuous tone without break, accomplished by the use of the cheeks as a reservoir of air while breathing through the nose rather than the mouth. It has been suggested that practicing this wind instrument may train airway muscles leading to less collapse of oropharyngeal muscles at night, resulting in its beneficial effect on sleep apnea.

To our knowledge, no epidemiological study has tested for an association between OSA, or its associated features, and frequent use of wind instruments. We hypothesized that playing a wind

instrument would be associated with a reduced risk of OSA. To test this hypothesis, we undertook a cross-sectional survey of professional orchestra players.

2. Methods

We conducted a web-based survey of professional orchestra members. This study was granted an exemption by the University of Michigan Institutional Review Board.

2.1. Subjects

The International Conference of Symphony and Opera Musicians (ICSOM) is a professional organization that represents over 4000 orchestral musicians from the top 52 American Federation of Musician orchestras in the United States and Puerto Rico. Orchestras range in size, the largest ones having over 100 musicians. They are typically comprised of four main sections: strings, winds, percussion, and keyboard. Wind instrument players typically represent approximately 30% of the orchestra and are almost equally divided into two groups: woodwinds and brass. ICSOM has email addresses on 3665 of their approximately 4300 active musician members.

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2.2. Sample size and power

We anticipated roughly 1000 respondents and made the following assumptions: type 1 error of 0.05, 80% power, 26% prevalence of high risk for sleep apnea in non-wind instrument players [6], and a ratio of wind to non-wind player respondents of 1:2. Given these assumptions, the sample size of 1000 would allow for a detectable difference in prevalence of high risk for sleep apnea between non-wind and wind instrument players of 8% or, alternatively, an odds ratio of 0.64 [7].

2.3. Study procedures

ICSOM sent an email to all active members for whom they had a registered email address that introduced the study and offered anonymous participation through a hyperlink to the survey. Two follow-up emails were sent approximately 1 week apart to remind subjects of the survey.

2.4. Survey instrument

The questions asked in the survey included the Berlin questionnaire, a validated tool that predicts sleep apnea risk [8]. Berlin questionnaire results were scored in the standard fashion resulting in a dichotomized “high risk for OSA” and “lower risk for OSA.” Subjects who earned high risk scores for at least two of the three symptom categories were considered to be at high risk for OSA [8]. Additional questions were asked about demographics, medical history including diagnosis of OSA by a physician, and other baseline characteristics including height and weight. Subjects were asked to identify the primary instrument played in the orchestra, number of hours per week the instrument was typically played, and the age at which playing the instrument was begun. To assess for misclassification of exposure to playing wind instruments, subjects were asked about any other instrument that they routinely played more than 1 h per week aside from the primary instrument played in the orchestra. Use of circular breathing was also assessed in a dichotomous fashion.

2.5. Statistical analysis

Demographics and baseline characteristics were assessed using descriptive statistics. Body mass index (BMI) was calculated from the self-reported height and weight using the formula [(weight in pounds/height in inches²) × 703]. Comparisons were made between those at high risk and those at lower risk for sleep apnea based on their Berlin scores using chi square tests for dichotomous variables and t-tests for continuous variables. To test the primary hypothesis, logistic regression was used to assess the association between wind instrument playing (compared with all other instrument groups combined) and being at high risk for sleep apnea. Adjustment for age, BMI, and gender were pre-specified before data collection. Age and BMI were treated continuously in the model. Odds ratios (OR) with 95% confidence intervals (CI) were calculated.

In exploratory analyses, wind instrument players were further divided into woodwinds and brass. Logistic regression was used to assess the association between woodwind and brass instrument playing and being at high risk for sleep apnea. In this model, woodwind and brass instrument playing were modeled as dummy variables with all other instruments as the referent group. The association between high sleep apnea risk and use of circular breathing was then tested by comparing those wind players who use circular breathing with all other instrument players. The association between a physician diagnosis of OSA and (1) playing a wind instrument compared with all other instruments and (2)

wind players who use circular breathing compared with all others was also tested. Exploratory analyses were conducted with and without adjustment for age, BMI, and gender. All analyses were conducted using S-plus 7.0 for Windows.

3. Results

There were a total of 1111 survey respondents (30% response rate). Demographic characteristics are found in Table 1. Six respondents did not indicate that any instrument was played, leaving 1105 for analysis. There were a total of 369 wind players: 175 (47%) played a brass instrument, while 194 (53%) played a woodwind. Fifty-five (15%) of the wind players used circular breathing. Of the non-wind players, 670 played a string instrument (bass ($n = 92$, 14%), cello (127, 19%), viola (146, 22%), violin (305, 46%)), 55 played percussion (harp (16, 29%), percussion (30, 55%), timpani (9, 16%)), and 12 played a keyboard instrument. On average, wind players played their instrument 25.8 h per week (SD = 8.8); while non-wind players played an average of 27.3 h per week (SD = 8.6). Only one non-wind player played a wind instrument (flute) more than 1 h per week. On average, wind players started playing their instrument at age 11.3 (SD = 3.2); while non-wind players began playing their instrument at age 9.0 (SD = 4.6).

Of the 1105 respondents, 348 (31%) had high risk for sleep apnea determined by their Berlin questionnaire scores. In bivariate analysis, playing a wind instrument was positively associated with a high sleep apnea risk (OR = 1.47 (95% CI: 1.13, 1.91)), but after adjusting for age, gender, and BMI, this association was not significant (OR = 1.12 (95% CI: 0.82, 1.54)). Age, BMI, and male gender were positively associated with high sleep apnea risk. Results of the multivariable model are found in Table 2.

When assessing brass players alone (referent group all non-wind instrument players), results were similar, with a significant association in bivariate analysis (OR = 2.24 (95% CI: 1.60, 3.14)), but a non-significant result (OR = 1.36 (95% CI: 0.91, 2.03)) after adjusting for age, gender, and BMI. When assessing woodwind players only (referent group all non-wind instrument players), the association was not significant in either bivariate (OR = 0.96 (95% CI: 0.67, 1.37)) or adjusted analysis (OR = 0.94 (95% CI: 0.62, 1.40)). Among all instrument groups, circular breathing was not associated with a high risk of sleep apnea in bivariate (OR = 0.98 (95% CI: 0.54, 1.76)) or adjusted (OR = 0.71 (95% CI: 0.34, 1.46)) analyses.

There was no association between playing a wind instrument and having a physician diagnosis of OSA in bivariate (1.60 (95%

Table 1
Demographics by instrument played

	Wind ($n = 369$) N (%) or 95% CI	Non-wind ($n = 736$) N (%) or 95% CI	p-value
Age	46.7 (45.4, 47.9)	46.8 (45.9, 47.7)	0.8358
Weight	176.5 (171.9, 181.0)	162.0 (159.3, 164.6)	<0.001
Male	233 (68)	330 (48)	<0.001
Non-hispanic	328 (98)	651 (97)	0.41
Race			0.0039
Caucasian	331 (97)	616 (91)	
Asian	5 (1)	48 (7)	
Other	5 (1)	11 (1)	
BMI	26.1 (25.5, 26.6)	24.7 (24.4, 25.0)	<0.001
Hypertension	61 (18)	94 (14)	0.21
Smoking			0.017
Current	11 (3)	40 (6)	
Previous	67 (20)	172 (25)	
Never	263 (77)	472 (69)	
Known OSA	27 (8)	35 (5)	0.075
Tonsillectomy	107 (31)	205 (30)	0.655
High risk Berlin score	137 (37)	211 (29)	0.0043

*Numbers do not all sum to total n due to missing responses.

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