Prospective Occupational Screening For Obstructive Sleep Apnea In Volunteer Commercial Drivers

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Rationale

Screening for obstructive sleep apnea (OSA) in commercial drivers is imperative because OSA is common in this group, causes daytime sleepiness and may lead to vehicular crashes. We evaluated whether data obtained during a simulated pre-employment examination can identify latent cases of OSA among volunteers that hold commercial driving licenses in the Philadelphia area.

Subjects

We solicited participants using internet advertisements.

Inclusion criteria were: age 18 to 65 years, residence within 40 miles of the Penn Sleep Center, and possession of a valid commercial driver's license.

Exclusion criteria were: current use of continuous positive airway pressure (CPAP), bi-level positive airway pressure (BiPAP), or supplemental oxygen; nocturnal hypoxia due to another medical illness; somatic or psychiatric complaint that precluded ability to complete study procedures.

Methods

For each subject, we simulated a medical-certification exam described by the Federal Motor Carrier Safety Administration (FMCSA). During the examination, we recorded demographic variables, body mass index (BMI), neck circumference (NC), apnea symptoms (Sx) and Epworth Sleepiness Scale score (ESS).

Using data on BMI, age, gender and symptoms, we computed the multivariable apnea prediction (MAP) for each driver (range 0=no risk to 1=maximal risk)[1].

We then conducted unattended oximetry and concurrent Type II portable sleep studies in the subject's home. From these recordings, we computed the 4% desaturation index (ODI4) and Apnea-Hypopnea Index (AHI). ODI4 was calculated as the number of desaturations >=4% divided by recording time. Apneas and hypopneas were scored using American Academy of Sleep Medicine (AASM) criteria by a technologist who was blind to all other data. The AHI equaled apneas plus hypopneas divided by EEG-derived sleep time.

Results

For 39 drivers, demographic variables, examination data, and poylsomnographic indices are shown in Table 1 . MAP and ODI4 correlated strongly with OSA severity (AHI). For MAP, the Spearman Rank and Pearson correlation coefficients were 0.59 and 0.53, respectively, and indicated excellent discriminatory power. For ODI4, these values were 0.86 and 0.95, respectively (See Table 2).

Table 1. Subject characteristics

	N (%)	Mean ± SD	Range
Number of subjects	39	-	-
Males (%)	36 (92%)	--	--
Age (years)	- -	43.7 ± 9.8	24.4–63.6
Race			
Caucasians	25 (64%)	--	--
African-Americans	14 (36%)	--	--
Anthropometry			
BMI (kg/m^2)	-	31.9 ± 6.0	21.6–48.7
NC (cm)	-	42.5 ± 4.1	34.2.–54.5
ESS score	--	7.4 ± 5.2	0.0–22.0
ESS Score > 10	7 (18%)	-	-
MAP index	--	0.6 ± 0.2	0.1–0.9
Polysomnography			
AHI	36 (92%)	25.9 ± 24.9	1.6–88.9

AHI >=5/hour	33/36 (92%)	--	-
AHI >=15/hour	17/36 (47%)	-	-
AHI >=30/hour	9/36 (25%)	-	-

Table 2 Spearman Rank and Pearson correlation coefficients, N=36

	Age	NC	BMI	Sx	ESS	MAP	ODI4	AHI
Spearman	0.18	0.33	0.41	0.44	0.12	0.59	0.86	1
Pearson	0.20	0.29	0.30	0.43	0.27	0.53	0.95	1

Conclusions

In this research setting, there was a high prevalence of self-reported sleepiness. Obstructive sleep apnea was also highly prevalent, and could be readily identified by MAP and home-oximetry. However, future analyses must avoid reliance on symptoms, since subjective data may be inaccurate in an occupational setting.

References

1. Maislin G, et al. A survey screen for prediction of apnea. SLEEP 1995:18.

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