The difference of sleep quality between 2-channel ambulatory monitor and diagnostic polysomnography

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ABSTRACT:

Background: Standard diagnostic test is in-laboratory, technician-attended polysomnography is labor-intensive and limited in its availability. Ambulatory monitors allows for unattended recording of a limited number of biosignals in the patient's home, where usual bedtime rituals and the familiar home sleeping environment provide a sense of stability. Quality in the test night may influence the reliability of the associated parameters. Our study tested the sleep quality of snoring patients between hospital PSG and home AM.

Method: We recruited snoring patients with severe snoring, daytime sleepiness and age above 20 years old. This study used the standard 2 x 2 crossover design. Each subject was randomly assigned to either sequence 1 (home AM first) or sequence 2 (hospital PSG first). Sleep quality was assessed using standard 10-cm visual analogue scales (VAS) after each testing period. 10-score meant good sleep quality.

Result: A total of 84 patients completed the study. For patients with moderate to severe OSA, the sensitivity of home AM device was 95.5%; the specificity was 88.2%. For each subject, the data of hospital PSG and that of home AM were compared (Table 2). Female and elder patients had worse reported sleep quality in the sleep laboratory.

Conclusions: Home ambulatory monitor test showed good diagnostic performance compared with standard diagnostic polysomnography in patients with a high pretest probability of moderate to severe obstructive sleep apnea. No doubtly, patients had better sleep quality in home sleep environment than hospital sleep laboratory. In hospital laboratory setting, female and old age may have worse sleep quality, and ambulatory monitor may be considered in these patients.

Key Words: polysomnography; home ambulatory monitor

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INTRODUCTION

Obstructive sleep apnea (OSA) is common in men and women over the age of 30 years. Because of its association with hypertension, heart disease and stroke, OSA is of considerable public health concern. Standard diagnostic test is in-laboratory, technician-attended polysomnography (PSG), which monitors sleep, respiration, cardiac rhythm, snoring, limb movements and body position. However, PSG is labor-intensive and limited in its availability. Ambulatory monitors (AM) have been developed to be alternative tools of diagnosis. They allows for unattended recording of a limited number of biosignals in the patient's home, thereby increase or reduce the likelihood of sleep apnea and facilitate triage for definitive PSG.

Many sleep-disordered suffers may view the sleep laboratory as a setting where poor sleep is expected and understood by those professionals conducting the sleep recordings. In contrast with sleep laboratory, usual bedtime rituals and the familiar home sleeping environment provide a sense of stability.

As we known, sleep quality in the test night may influence the reliability of the associated parameters. Our study tested the sleep quality of snoring patients between hospital PSG and home AM.

METHODS

We recruited snoring patients from 3 hospitals and 36 local clinics in southern Taiwan. Inclusion criteria included severe snoring, daytime sleepiness and age above 20 years old. Subjects with mental disorder, neuromuscular disease, chronic obstructive pulmonary disease or stroke were excluded.

This study used the standard 2 x 2 crossover design (Figure 1). Initially, local examination of upper airway and questionnaire were performed. Each subject was randomly assigned to either sequence 1 (home AM first) or sequence 2 (hospital PSG first). Subjects in sequence 1 received home AM (ApneaLink, ResMed; 1 night) during the first intervention period and hospital PSG (Somte, Compumedics; 1 night) during the second intervention period. Subjects in sequence 2 received hospital PSG during the first intervention period and home AM during the second intervention period. Intervention

periods were separated by a period of 2 weeks.

Test parameters included Apnea Hypopnea Index (AHI), lowest oxygen saturation (SpO2) and total sleep time (TST). Sleep quality was assessed using standard 10-cm visual analogue scales (VAS) after each testing period. 10-score meant good sleep quality.

RESULTS

A total of 84 patients completed the study (Table 1). Fifty (59.5%) were male subjects. The average age was 44.0 years (SD=10.8). The body mass index (BMI) was 26.9 kg/m2 (SD=3.1). Neck circumference was 39.3 cm (SD=3.0). The average score of Pittsburgh Sleep Quality Index was 6.2 (SD=3.1).

For patients with moderate to severe OSA, the sensitivity of home AM device was 95.5%; the specificity was 88.2%.

For each subject, the data of hospital PSG and that of home AM were compared (Table 2). The AHI of PSG was 36.0/hr, and that of HST was 29.5/hr (p=0.230). The TST of PSG was 6.9 hours, and that of HST was 7.0 hours (p=0.997). The reported sleep quality of PSG was 3.9, and that of HST was 6.9 (p=0.010).

The correlations between the influence factors and reported sleep quality were presented in Table 3. Female and elder patients had worse reported sleep quality in the sleep laboratory.

CONCLUSION

Home ambulatory monitor test showed good diagnostic performance compared with standard diagnostic polysomnography in patients with a high pretest probability of moderate to severe obstructive sleep apnea. No doubtly, patients had better sleep quality in home sleep environment than hospital sleep laboratory. In hospital laboratory setting, female and old age may have worse sleep quality, and ambulatory monitor may be considered in these patients.

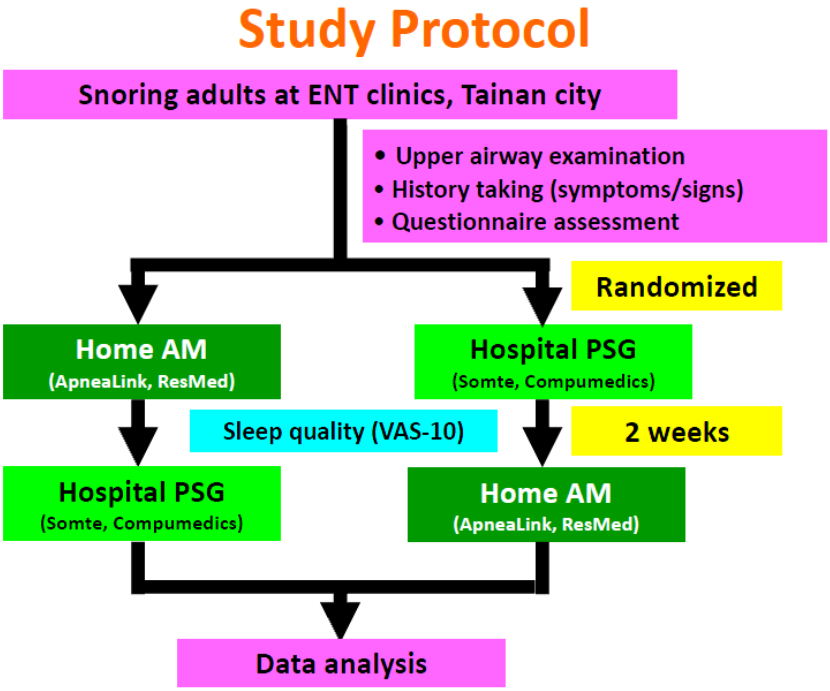

Figure 1. A prospective and 2 x 2 crossover study in southern Taiwan.

Variable	Mean (SD)	Normal range
Age (years)	44.0 (10.8)	
Height (cm)	168.4 (7.8)	
BW (kg)	76.4 (11.4)	
BMI (kg/m²)	26.9 (3.1)	Normal:18.5-24; Obese: ≧30
Neck circumference (cm)	39.3 (3.0)	
Waist circumference (cm)	93.5 (8.2)	
Hip circumference (cm)	103.7 (6.5)	
Waist - Hip ratio	0.9 (0.1)	M: ≦0.9; F: ≦0.8
PSQI score (0-21)	6.2 (3.1)	<5

Table 1. Demographic data (n=84) (73M, 11F)

Variable	Hospital PSG	Home AM	*P* value
AHI (/hr)	36.0 (22.2)	29.5 (18.9)	0.230
Lowest SpO2 (%)	74.1 (10.0)	77.5 (6.8)	0.521
Total sleep time (hr)	6.9 (0.5)	7.0 (1.2)	0.997
Reported sleep quality (VAS-10)(Bad→Good)	3.9 (1.6)	6.9 (1.8)	0.010

Table 2. Differences between hospital PSG and home AM in patients with severe snoring. (n=84)

Variable	Reported sleep quality (VAS-10)			
	Hospital PSG		Home AM	
	β	*P* value	β	*P* value
Sex		0.030		0.810
Male	5.438		7.699	
Female	4.091		7.818	
Age (years)	-0.078	<0.001	0.037	0.017
BMI (kg/㎡)	0.038	0.573	0.055	0.309
PSQI score (0-21)	-0.005	0.938	-0.013	0.817
AHI (/hr)	-0.006	0.529	-0.007	0.384
Total sleep time (hr)	0.278	0.537	0.608	0.084

Table 3. The correlation between different variables and reported sleep quality, in different sleep test settings.