



Adherence Rate of Positive Airway Pressure After Korean National Health Insurance Coverage

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Abstract

Introduction: Obstructive sleep apnea (OSA) is a disease that decreases the quality of sleep and increases morbidity. Positive airway pressure (PAP) treatment is known to be the most effective method in OSA. Since July 2018, the national health insurance has been applied to PAP, reducing the financial burden on patients. This study aims to examine the adherence of patients prescribed PAP before and after insurance and to analyze factors that have influence on the adherence.

Methods: As a retrospective study, the adherence of the group of patients who were prescribed PAP from July 2016 to June 2018, and the group from July 2018 to September 2020 after the insurance coverage was compared. A patient's underlying disease, Epworth sleepiness scale (ESS) and polysomnography (PSG) results, as well as PAP adherence for the 1st, 3rd, 6th, 9th month were examined.

Results: The patients were divided into pre- (pre-I, n=26) and post-national health insurance (post-I, n=168) groups. Mean age of each group was 47.3 (pre-I) vs 49.6 (post-I) (p=0.240) and male: female ratio was 21:5 vs 142:26 (p=0.158). ESS was 10.0 vs 9.1 and apnea-hypopnea index (AHI) was 52.8 vs 50.5. Adherence of each month for pre-I and post-I was 73% vs 67%, 71% vs 64%, 53% vs 46%, 44% vs 41%. Patients with cerebrovascular accident were more adherent to PAP (p=0.000).

Conclusions: The adherence of PAP therapy might not be related with the insurance coverage for OSA patients.

Introduction

Obstructive sleep apnea (OSA) is a sleep disorder characterized by abnormal upper airway obstruction during sleep, leading to poor sleep quality and various daytime issues. Treatment options for OSA include oral appliances, surgical procedures involving oropharynx and tongue base, and positive airway pressure (PAP) therapy, with PAP being the most recommended method. However, PAP therapy's success depends on patient adherence, which can vary from 28% to 83%, posing a challenge due to its relatively high cost. Untreated OSA can lead to cardiovascular problems, diabetes, depression, and other conditions, increasing the demand for insurance coverage for PAP therapy. Korean National Health Insurance (NHI) coverage for PAP devices has been provided to OSA patients from July 2018, with coverage extending for 90 days (compliance period) after the initial prescription date, as long as the patient uses the device for at least 4 hours per day, for a minimum of 21 days (70%). This study aims to compare adherence during treatment between patients treated with PAP therapy after the insurance transition in July 2018 and those treated before, while identifying influencing factors.

Methods and Materials

This study involved 194 patients diagnosed with OSA and prescribed PAP therapy at a medical center. The study compared adherence to PAP therapy between two groups: those prescribed PAP from July 2016 to June 2018 (pre-I, 26 patients) and those prescribed PAP from July 2018, when Korean NHI coverage started, to September 2020 (post-I, 168 patients). To assess daytime symptoms, the Epworth Sleepiness Scale (ESS) scores were recorded before polysomnography (PSG). OSA diagnosis criteria included apnea-hypopnea index (AHI) of 5 or higher on PSG and related symptoms or coexisting conditions (hypertension, diabetes, stroke, coronary artery disease) or AHI of 15 or higher even without symptoms. PSG parameters included AHI, longest apnea duration, and lowest oxygen saturation.

In cases where PSG results indicated a need for PAP therapy, care givers randomly recommended devices from two companies. Good adherence was defined as using the device for at least 4 hours per day, maintaining a compliance rate of 70% or higher throughout the observation period. Adherence was monitored at 1-month, 3-month, 6-month, and 9-month intervals following the prescription.

To compare adherence to PAP therapy between the two groups, independent-sample t-tests, chi-square tests, and generalized estimating equation (GEE) models were utilized. IBM SPSS Statistics 26 was used for statistical analysis, with a p-value less than 0.05 considered statistically significant.

Results

There were no significant differences in demographic characteristics between pre-I and post-I groups, including age (47.4±16.7 vs 49.7±12.8), gender distribution (male 80.8% vs male 84.5%, p=0.158), and body mass index (BMI). The baseline conditions, such as diabetes, hypertension, cardiovascular, and cerebrovascular diseases, did not significantly differ. PSG parameters, including the AHI (52.8 vs 50.5, p=0.221), longest apnea duration, and lowest oxygen saturation showed no significant differences between the two groups.

Adherence before and after NHI coverage during the observation period is as follows (Table 1). PAP adherence decreased over time after prescription. There was no significant differences in adherence changes between the two groups based on NHI coverage. Notably, both groups exhibited the most substantial decline in adherence between the 3-month and 6-month (Fig. 1).

During the observation period, both groups exhibited a decreasing trend in the proportion of patients adhering to treatment over time (Table 2). When comparing the percentage of patients demonstrating good adherence over the entire duration, no significant differences were observed during the observation period. This suggests that the decrease in frequency and adherence of PAP therapy was more influenced by the duration of therapy rather than whether insurance coverage was provided.

To analyze the factors influencing adherence, the patients were categorized into adherent and non-adherent groups (Table 3). Among post-insurance patients using PAP therapy, those with cerebrovascular diseases had higher adherence. No significant differences were found in adherence related to other baseline conditions or ESS scores. PSG results indicated that adherent group had lower sleep efficiency and higher periodic limb movement index (PLMI).

Table 1. PAP adherence of pre- and post-insurance patients according to time

Time	Pre-I (n=26)	Post-I (n=168)	Source	p-value
1 month	73 ±23	67 ±30	Time	<.000*
3 month	71 ±27	64 ±36	Group	0.338
6 month	53 ±37	46 ±39	Time*Group	0.895
9 month	44 ±37	41 ±40		
Mean	59 ±25	47 ±12		

Values are presented as mean±SD.

PAP adherence was presented as percentage (%) of days used for at least 4 hours of the night.

*p<0.05: significant effect by 2-way repeated measures analysis of variance

PAP: positive airway pressure; Pre-I: pre-insurance; Post-I: post-insurance

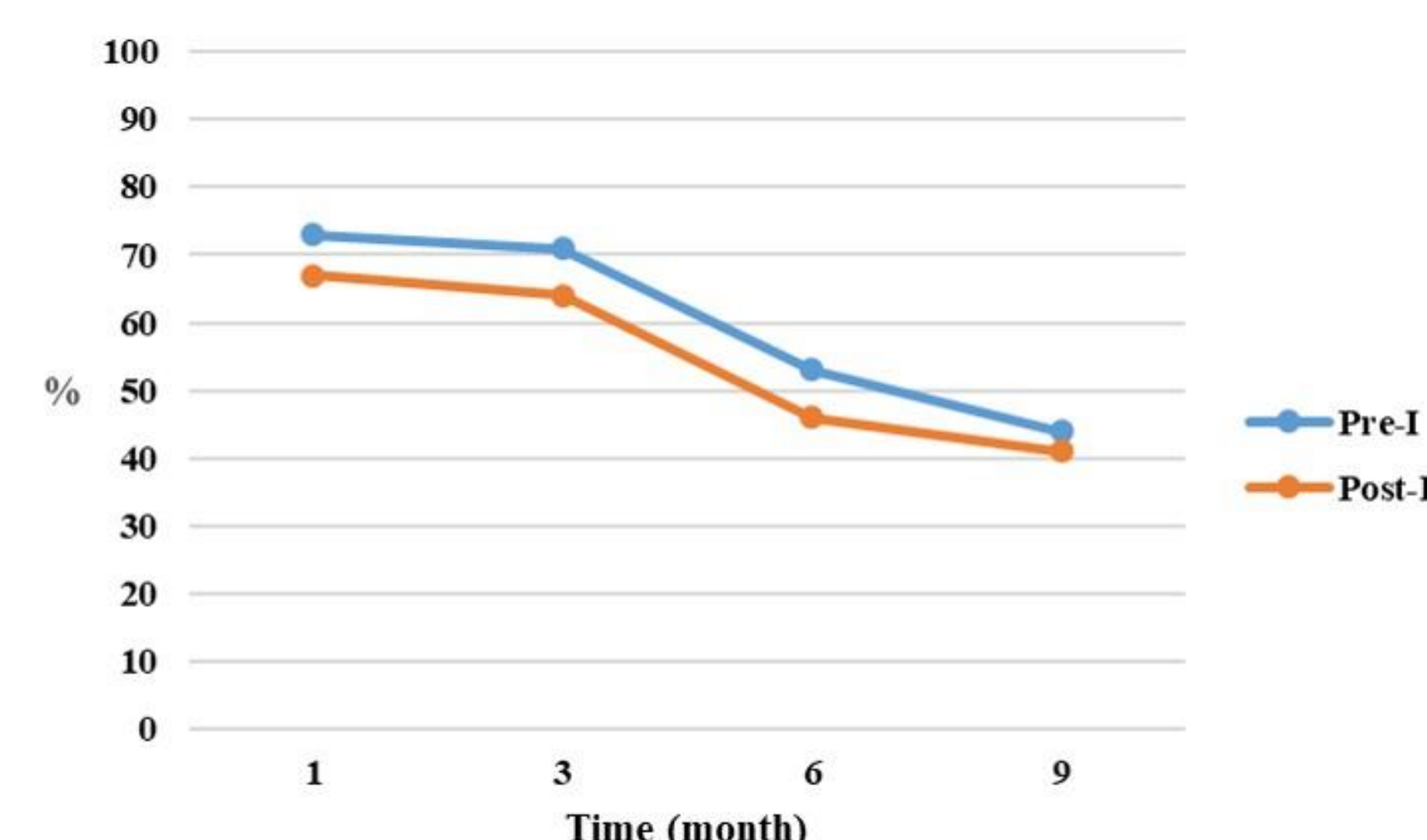


Figure 1. PAP adherence of pre- and post-I patients according to time. The most decrease of the adherence was observed from 3 months to 6 months, which was 18% for each group.

PAP: positive airway pressure; Pre-I: pre-insurance; Post-I: post-insurance

Table 2. Effect of NHI on PAP adherence according to time

Time	Total	Pre-I (n=26)	Post-I (n=168)	p-value	Source	p-value
	N (%)	N (%)	N (%)			
1 month	117 (60.3)	18 (69.2)	99 (58.9)	.392	Time	<.001*
3 month	129 (66.5)	20 (76.9)	109 (64.9)	.270	Group	0.459
6 month	80 (41.2)	11 (42.3)	69 (41.1)	1.000	Time*Group	0.630
9 month	69 (35.6)	9 (34.6)	60 (35.7)	1.000		

*P<0.05 : significant effect by generalized estimation equation

NHI: National health insurance, PAP: positive airway pressure, Pre-I: pre-insurance; Post-I: post-insurance

Table 3. Comparison between adherent and non-adherent patients to PAP

characteristics	categories	Non-adherent group (n=129)	Adherent group (n=43)	p-value
Sex	Male	109 (87.2%)	33 (76.7%)	0.102 ^b
BMI		28.5 ±5.8	28.5 ±3.8	0.324 ^a
Age		52.1 ±12.8	48.8 ±14.5	0.289 ^a
AHI		56.1 ±30.8	48.6 ±35.8	0.980 ^a
Diabetic mellitus		10 (8%)	6 (13.9%)	0.251 ^b
Hypertension		42 (33.6%)	16 (37.2%)	0.668 ^b
Hyperlipidemia		8 (6.4%)	0 (0%)	0.089 ^b
Cardiovascular disease		12 (9.6%)	4 (9.3%)	0.954 ^b
Cerebrovascular accident		0 (0%)	3 (6.9%)	0.000*
Epworth sleepiness scale		9.0 ±4.1	8.8 ±4.7	0.456 ^a
Total Sleep Time (Min)		325.1 ±81.0	326.8 ±87.5	0.953 ^a
NREM sleep (%)		81.0 ±10.0	82.9 ±7.3	0.571 ^a
Sleep latency (Min)		7.8 ±8.8	9.9 ±8.6	0.486 ^a
Sleep efficiency (Min)		81.8 ±13.2	78.3 ±15.2	0.034*
Lowest O ₂ saturation (%)		76.2 ±10.5	74.9 ±9.58	0.979 ^a
Longest apnea (Sec)		51.8 ±26.4	50.8 ±22.8	0.330 ^a
PLMI (/hr)		0.72 ±2.42	2.4 ±7.9	0.000*

Values are presented as mean±SD or n (%).

*p<0.05, ^aIndependent t-test, ^bChi-square test,

BMI: body mass index, AHI: apnea-hypopnea index, ESS: Epworth sleepiness scale, NREM: non-rapid eye movement, PLMI: periodic limbic movement index

Discussion

This study found no significant differences in adherence, regardless of insurance coverage, contrary to prior research indicating increased adherence during the initial three months post-insurance adoption. In this study, it was observed that adherence during the initial three months post-prescription was effectively maintained, irrespective of insurance coverage. Furthermore, it was confirmed that many patients initiated PAP therapy after insurance implementation. While it was generally expected that economic factors would influence PAP adherence; reducing economic burdens by NHI coverage appeared to lead to increased adherence and lower economic burdens are a clear factor in influencing adherence. However, there might not be a direct and pronounced association between economic burden and patient adherence in this study.

Patients with OSA typically exhibit associations with conditions such as hypertension, diabetes, hyperlipidemia, cardiovascular, and cerebrovascular diseases. Although this study found no differences in baseline conditions between insured and uninsured groups, previous research suggested that conditions like hypertension might reduce adherence. Surprisingly, in this study, patients with prior cerebrovascular diseases demonstrated better adherence, possibly due to heightened awareness of their severe health condition, motivating greater PAP adherence. Adequate explanations by healthcare providers about progression and complications of OSA could maintain adherence, regardless of insurance status.

The study revealed a significant decline in PAP adherence after six months, particularly between the 3rd and 6th months, highlighting the challenge of sustaining adherence post-prescription. Healthcare providers tend to prioritize initial adherence improvement, but more attention to device management and factors affecting patient usage is crucial during the 3-6 month period.

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