



The Effect of Sleep Hygiene Education on Sleep Quality of Individuals with Essential Hypertension

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ORİJİNAL RESEARCH

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Hypertension negatively affects sleep quality. This study aimed to evaluate the effect of sleep hygiene training on sleep quality in individuals with essential hypertension. The effect of sleep hygiene education on patients with essential hypertension was evaluated. Sleep quality results were measured before and after training. Data were collected by sociodemographic information, past medical history, sleep score scale, and Pittsburgh Sleep Quality Index (PSQI). Patients who visited the clinic during the study period (n=42). 52.4% of the participants were male and the average age of the participants was 51.2±3.7. While the average PSQI score of individuals with essential hypertension was 10.0±2.73 before sleep hygiene training, it decreased to 6.0±1.76 after the training. This improvement was statistically significant (p<0.05). After sociodemographic adjustments, no pre- and post-training differences were found in PSQI scores. Sleep hygiene training was found to be effective in improving individuals' sleep quality. The sleep quality of individuals with essential hypertension should be evaluated regularly. Sleep hygiene education programs may help patients with essential hypertension who experience sleep problems.

Key Words: Hypertension, Sleep, Education, Nursing

Esansiyel Hipertansiyonlu Bireylerde Uyku Hijyeni Eğitiminin Uyku Kalitesine Etkisi

Öz

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Amaç: Hipertansiyon, uyku kalitesini olumsuz etkiler. Bu çalışma, esansiyel hipertansiyonlu bireylerde uyku hijyen eğitiminin uyku kalitesine etkisini değerlendirmeyi amaçlanmıştır. Esansiyel hipertansiyonlu hastalara uyku hijyen eğitiminin etkisi değerlendirildi. Uyku kalite sonuçları eğitim öncesi ve sonrasında ölçüldü. Veriler Sosyodemografik bilgiler, geçmiş tıbbi öykü, uyku puanı ölçeği ve Pittsburgh Uyku Kalitesi İndeksi (PSQI) ile toplandı. Çalışma döneminde kliniği ziyaret eden hastalar (n=42). Katılımcıların %52.4'ü erkek olup, katılımcıların yaş ortalaması 51.2±3.7 idi. Esansiyel hipertansiyonu olan bireylerin ortalama PSQI skoru, uyku hijyen eğitiminden önce 10.0±2.73 iken, eğitim sonrasında 6.0±1.76'ya düştü. Bu iyileşme istatistiksel olarak anlamlıydı (p<0.05). Sosyodemografik düzeltmelerden sonra, PSQI skorlarında eğitim öncesi ve sonrası fark bulunmadı. Uyku hijyen eğitimi, bireylerin uyku kalitesini iyileştirmede etkili bulundu. Esansiyel hipertansiyonu olan bireylerin uyku kalitesi düzenli olarak değerlendirilmelidir. Uyku hijyen eğitim programları, uyku sorunları yaşayan temel hipertansiyon hastalarına yardımcı olabilir.

Anahtar Kelimeler: Hipertansiyon, Uyku, Eğitim, Hemşirelik

Introduction

Technological advances in the diagnosis and treatment of disease have led to dramatic increases in life expectancy at birth. With longer life typically comes a heavier burden of chronic disease (Turkey Heart Report 2000; Öngen, 2005; Knutson, Van Cauter and Rathouz, 2009). In particular, prevalence of hypertension has increased the population as the population aged. According to The World Health Organization (WHO), there are about one billion hypertension patients globally (World Health Organization, 2013). In Turkey, the Cardiovascular Disease and Risk Factors in Turkish Adults (TEKHARF) s found that 33.7% of Turkish adults had hypertension in 2009 (Onat et al., 2009). According to the Prevalence, Awareness and Treatment of Hypertension in Turkey (Patent) study, the age-and gender-adjusted prevalence of hypertension is 31.8% (Altun, 2005; Abacı, 2011).

Patients with essential hypertension may experience changes in daily activities that negatively affect quality of life (Kara and Karakurt, 2007). One such change is deterioration in sleep quality (Legramante and Galante, 2005). Among the factors that may negatively influence sleep quality in people with essential hypertension are psychosocial causes like stress and anxiety, as well as medication side effects (Legramante and Galante, 2005; Altun, 2005; Kara and Karakurt, 2007; Knutson, Van Cauter and Rathouz, 2009; Abacı, 2011).

Deterioration in sleep quality among people with essential hypertension also negatively affects their prognosis (Gökdoğan, 1995; Doğan, 2004). Hypertensives with a further diagnosis of obstructive sleep apnea have demonstrated higher heart rate and blood pressure, and individuals on antihypertensive medication have lower sleep quality in comparison to individuals who are not on antihypertensive medication (Lusardi et al., 1999).

Nursing care should include initiatives aimed at improving sleep quality among people with essential hypertension (Brostörn et al., 2001; Redeker and Stein, 2006). Nurses are in an ideal position as educators to provide needed information to help people with essential hypertension adopt sleep-positive behaviors. Sleep hygiene education provided by nurses could help to prevent complications arising from insomnia, thereby improving patient quality of life (Redeker and Stein, 2006; Paparrigopoulos, 2010). This goal of this study was to assess the impact of nurse-provided sleep hygiene education on sleep quality among people with essential hypertension.

Material and Methods

Aims

This study implemented a pre-test / post-test intervention pattern to determine the impact of sleep hygiene education on sleep quality in patients with essential hypertension.

Participants Sample

The sample was comprised of individuals with essential hypertension who contacted the hospital in which the study was carried out internal medicine/cardiology department, where data were collected, between November 2012 and April 2013. To be included in the study, participants were required to be adults between the ages of 35-60 years old, with at least a 6-month history of essential hypertension, had documented medication for essential hypertension, had at least one additional chronic condition other than essential hypertension, was not diagnosed with sleep apnea, were primary school graduates, had a score of 5 or above in their sleep score, had no communication difficulties, and lived in that the respondents were resident in the city in which the study took place.

Instruments and data collection

Data for the study were collected via a patient identification form, the Pittsburgh Sleep Quality Index (PSQI), and a sleep score scale.

The required sample size was determined to be 37 individuals based on a power analysis assuming 80% power, reliability of 95% ($\alpha=0.05$), and with $\beta=0.10$. We initially contacted 54 individuals but 12 declined to participate in the study following the sleep education intervention. Thus, the final analysis sample was 42 individuals.

Socio-demographic and Disease Characteristics

This survey collected information including socio-demographic factors (patients' age, gender, education, marital status, occupation, social security information, and income level), as well as information pertaining to the hypertension and medical comorbidities.

Pittsburgh Sleep Quality Index (PSQI)

The PSQI is a validated tool to assess sleep quality (Cronbach's alpha: 0.80). It was developed by Buysse et al. (1989) in 1989 and it was then validated in Turkey by Ağargün et al. (1996) with a Cronbach's alpha of 0.80. The internal consistency coefficient Cronbach's alpha of the scale in this study was 0.76. The PSQI consists of 24 questions. Self-evaluation

questions address various factors related to sleep quality, including sleep duration, sleep latency, and frequency and severity of subjective problems related to sleep. Six questions are answered by the spouse or a friend of the subject, but these questions are supplemental, and used for clinical purposes; they are not included in the calculation of total or component points for the purposes of this research. Further question 19 is discarded from scoring. Thus the PSQI is scored based on 18 items that are then grouped into 7 component scores. Some of the components are composed of one item, whereas others are composed of several grouped items. Each item is scored with 0-3 points.

Sleep Score Scale

The scale evaluates the subjective adequacy of sleep. Participants rated their sleep using a 1-10 point scale, with “1” referring to very bad sleep quality and “10” referred to very good sleep quality. Individuals with sleep scores of less than 5 were considered to have bad sleep quality and were included in the study.

Sleep Hygiene Education

A sleep hygiene booklet was prepared by the researchers following a review of the relevant literature, and in consultation with faculty members of Erciyes University School of Healthcare Sciences (Büyüköztürk, 2000; Rahman, 2008; Erol and Enç, 2009 Lavie, Herer and Hoffstein, 2000; Nieto et al.,2000). Patients enrolled in the study were given individual sleep hygiene education in the seminar room of the hospital. The education included the use of question-and-answer, direct instruction, and visual materials. Among the scope of education topics were the definition of hypertension, normal and high levels of blood pressure, complications associated with hypertension, the importance of sleep in hypertension patients, suggestions for behavioral changes to improve sleep quality.

Following the formal 30-minute education session, participant questions were answered. In follow up phone calls and home visits, the living environments of the participants were evaluated. This evaluation included the arrangements necessary to achieve sleep hygiene in their home environments were made, such as moving the location of the beds from in front of windows to the central axis of the room in order to maximize daylight and enhance ventilation and control of room temperature.

The contents of the sleep hygiene education were prepared by the researchers by examining the related literature and then examined by 4 experts of the subject. The patient was also given a booklet of the contents of the training organized in the direction of expert opinions.

The training consists of a total of 6 session. The content of the interviews with the patient once a week is as follows;

- ✓ Session 1: PSQI scale was applied. Meetings with the patients were made.
- ✓ Session 2: Information on definition and treatment of illness hypertension.
- ✓ Session 3: Sleep hygiene principles were explained by giving information about the relationship between hypertension and sleep.
- ✓ Session 4-5: After the training, the investigator checked the cases where the individual was called by phone three times a week and once visited home to obey the sleep hygiene principles.
- ✓ Session 6: After the training phone and home visits were solved and the PSQI scale was applied.

Ethical Considerations

The study was approved by the Clinical Research Ethics Council of a university and in which the study was carried out, where the study was conducted. Participants provided written and verbal informed consent.

Data Analysis

Change in average PSQI scores of the participants before and after the sleep hygiene education was evaluated with Wilcoxon Signed Ranks test. The relationship between Pittsburgh Sleep Quality Index scores and independent variables were evaluated with Mann-Whitney U test and Kruskal-Wallis test.

Socio-demographic and Disease Characteristics of the Participants

Socio-demographic characteristics of individuals are presented in Table 1. The sample was 52.4% men, and 73.8% were 50 or older. The average age of the sample was 51.2 ± 3.7 . BMIs of 30 kg/m^2 or higher were measured in 54.8% of participants. Most (90.5%) were married, 40.5% were primary school graduates. Active employment was held by 42.9% of the participants, 95.2% collected social security, and 38.1% reported having low income.

Table 1. Socio-demographic Characteristics ($n=42$)

Characteristic	n/ %
Gender	
Female	20/47.6
Male	22/52.4
Age groups	
Age 35-49	11/26.2
Age 50 and above	31/73.8
Average Age ($\bar{X} \pm SS$) (min-max)	51.23 \pm 3.70 years (42-55)
BMI (kg/m²)	
25 – 29	19/45.2
30 and above	23/54.8
Marital Status	
Married	38/90.5
Single	4/9.5
Education	
Primary School	17/40.5
Secondary School	16/38.1
High School and above	9/21.4
Employment	
Employed	18/42.9
Unemployed	24/57.1
Income Level	
High	12/28.6
Middle	14/33.3
Low	16/38.1
Total	42

Disease characteristics of individuals are presented in Table 2. The average duration of diagnosed hypertension was 18.52 \pm 2.36 months, with 40.5% of participants reporting essential hypertension for more than two years at the time of the survey. Comorbid chronic conditions were reported by 38.1% of the sample. The most common comorbidity was congestive heart failure (56.3% of those with comorbidities). Antihypertensives were used by 90.5% of the sample for 6-12 months; beta blockers were most commonly used (45.2% of participants).

Table 2. Disease Characteristics (n=42)

Disease Characteristics	n/%
Duration of diagnosed essential hypertension	
6-12 months	13/31.0
13-24 months	12/28.0
25 months or more	17/40.5
Average diagnosis time ($\bar{X} \pm SS$)	18.52 \pm 2.36 months
Blood pressure measurement frequency	
Once per day	9/21.4

Once per week	11/26.2
Once per month	16/38.1
Once per year	6/14.3
Diagnoses of other chronic diseases	
Present	16/38.1
Not-present	26/61.9
Other chronic diseases (n:16)*	
Congestive heart failure	9/56.3
Diabetes Mellitus	4/25.0
Chronic Obstructive Pulmonary Disease	3/18.7
Medications used	
Beta blockers	19/45.2
Diuretics	5/11.9
Ca channel blockers	2/4.8
Ace inhibitors	16/38.1
Duration of antihypertensive medication usage	
6-12 months	38/90.5
13-24 months	4/9.5
Average medication usage period ($\bar{X} \pm SS$)	11.08 \pm 3.12 months

*Calculated over percentage n.

Pittsburgh Sleep Quality Index Scores of the Participants

Distribution of pre- and post-education PSQI sub scale score averages of participants are presented in Table 3. The average subjective sleep quality sub scale score before education was 2.54 \pm 0.67, whereas this score was 1.69 \pm 0.68 after education. Pre-post education improvements were observed in sleep latency, sleep duration, accustomed sleep effectiveness, sleep disturbance, sleep aid use, and daytime dysfunctionality. The change observed in all sub scales of the PSQI was found to be statistically significant ($p < 0.001$). The total PSQI score distributions of study participants before and after the sleep hygiene education are provided in Table 3. Study participants' average score in the scale before the education was 9.64 \pm 2.73, whereas the total score average after the education was found to be 5.61 \pm 1.76. This change in PSQI total score averages was found to be statistically significant ($p < 0.05$)

Table 3. Pre- and Post-Sleep Hygiene Education Total PSQI Score and Sub Score Distributions

Sub Score of Sleep Quality Scale	Prior to Education			Post-Education			p^1
	$\bar{X} \pm SS$	Median	Min-max	$\bar{X} \pm SS$	Median	Min-max	
Subjective sleep quality	2.54 \pm 0.67	2.00	1.0-3.0	1.69 \pm 0.68	2.00	1.0-3.0	$p < .001$
Sleep latency	1.85 \pm 0.84	2.00	0.0-3.0	1.14 \pm 0.75	1.00	0.0-3.0	$p < .001$
Sleep duration	1.97 \pm 0.84	1.00	0.0-3.0	1.21 \pm 0.84	0.00	0.0-1.0	$p < .001$
Accustomed sleep effectiveness	1.85 \pm 0.87	0.50	0.0-3.0	1.26 \pm 0.58	0.00	0.0-2.0	$p < .001$
Sleep disturbance	1.28 \pm 0.67	1.00	0.0-3.0	0.97 \pm 0.41	1.00	0.0-2.0	$p < .001$
Sleep aid use	1.19 \pm 0.50	0.00	0.0-2.0	1.07 \pm 0.34	0.00	0.0-2.0	$p < .001$
Daytime dysfunctionality	2.00 \pm 0.76	2.00	1.0-3.0	1.11 \pm 0.63	1.00	0.0-3.0	$p < .001$
PSQI total score	9.64 \pm 2.73		4.0-16.0	5.61 \pm 1.76		2.0-10.0	$p < .001$

¹Wilcoxon Signed Ranks test

Distributions of average pre-and post-education PSQI scores, stratified by socio-demographic characteristics, are presented in Table 4. There was a greater improvement (-4.18) among men than among women (-3.85) though improvements in both groups was significant ($p<0.05$). Improvements in PSQIs were noted for both age categories. Among 35-49 year olds, the mean improvement in score was -4.09; and among those 50 and older the mean improvement in PSQI was -4.00 ($p<0.05$) In terms of BMI category, there was less improvement in PSQI was seen in those with BMIs between 25-29 (-3.13) compared to those with BMI over 30, who had an average improvement of after the training, whereas those with BMI figures of 30kg/m² and above had an average PSQI improvement of -4.52 ($P<0.05$).

Married participants had an average increase in PSQI score of -3.25, whereas single people had an average improvement of -4.13. However, the pre-post education improvement in score was only statistically significant for single people. When the data were stratified by education, we found that PSQI score improved by -4.3 for primary school graduates, by -4.5 for secondary school graduates, and by -2.7 for high school graduates or higher. All differences were statistically significant ($p<0.05$).

After stratification by employment status, we found that employed participants had an average improvement in PSQI score of -3.55, whereas unemployed participants had an average improvement of -4.38; both of these improvements were found to be statistically significant. Improvements in PSQI by income level were as follows: for the high income group, the average improvement was -3.59; for the middle income group, average increase was -4.07; for the low income group, average improvement was -4.31. All of these improvements were statistically significant ($p<0.05$).

Table 4. Pre- and Post-Sleep Hygiene Education PSQI Score Distributions, Stratified by Selective Socio-demographic Characteristics

Socio-demographic characteristics		Prior to Education PSQI			Post-Education PSQI			<i>p</i> ¹
		$\bar{X} \pm SS$	Median	Min-Max	$\bar{X} \pm SS$	Median	Min-Max	
Gender	Female (<i>n</i> =20)	9.35±2.45	10.0	5.0-16.0	5.50±1.63	6.0	3.0-9.0	<i>p</i> <.001
	Male (<i>n</i> =22)	9.90±3.00	9.0	4.0-13.0	5.72±1.90	6.0	2.0-10.0	<i>p</i> <.001
<i>p</i> ²		0.509			0.817			
Age	35-49(<i>n</i> =11)	10.81±3.25	11.0	4.0-16.00	6.72±2.32	7.0	2.0-10.0	<i>p</i> =.005
	50 and above (<i>n</i> =31)	9.22±2.45	9.0	4.0-13.0	5.22±1.35	5.0	3.0-9.0	<i>p</i> <.001
<i>p</i> ²		0.100			0.018			
BMI	25-29 (<i>n</i> =19)	8.21±2.52	9.0	4.0-13.0	5.08±1.37	5.0	2.0-7.0	<i>p</i> <.001
	30 and above (<i>n</i> =23)	10.69±2.36	11.0	6.0-16.0	6.17±1.94	6.0	3.0-10.0	<i>p</i> <.001
<i>p</i> ²		0.063			0.122			
Marital Status	Married (<i>n</i> =38)	8.25±2.06	9.0	6.0-10.0	5.00±2.70	4.0	3.0-9.0	<i>p</i> =.068
	Single (<i>n</i> =4)	9.78±2.78	10.0	4.0-16.0	5.68±1.67	6.0	2.0-10.0	<i>p</i> <.001
<i>p</i> ²		0.280			0.255			
Education	Primary school (<i>n</i> =17)	10.00±2.64	10.0	6.0-16.0	5.70±1.86	5.0	3.0-9.0	<i>p</i> <.001
	Middle school (<i>n</i> =16)	9.87±2.87	10.0	4.0-14.0	5.37±1.62	6.0	2.0-8.0	<i>p</i> <.001
	High school and above (<i>n</i> =9)	8.55±2.69	9.0	4.0-13.0	5.88±1.96	6.0	3.0-10.0	<i>p</i> =.011
<i>p</i> ²		0.388			0.894			
Employment	Employed (<i>n</i> =18)	9.05±2.28	9.0	4.0-13.0	5.50±1.97	5.5	2.0-10.0	<i>p</i> <.001
	Unemployed (<i>n</i> =24)	10.08±3.00	10.5	4.0-16.0	5.70±1.62	6.0	3.0-9.0	<i>p</i> <.001
<i>p</i> ³		0.148			0.622			
Income	High (<i>n</i> =12)	9.25±2.66	9.0	4.0-13.0	5.66±1.61	6.0	3.0-9.0	<i>p</i> =.002
	Middle (<i>n</i> =14)	9.78±2.57	9.5	5.0-13.0	5.71±1.77	5.5	3.0-10.0	<i>p</i> =.001
	Low (<i>n</i> =16)	9.81±3.05	10.0	4.0-16.0	5.50±1.96	6.0	2.0-9.0	<i>p</i> =.001
<i>p</i> ²		0.804			0.960			

¹ Wilcoxon Signed Ranks test ² KW=Kruskal Wallis test ³ MW-U=Mann Whitney U test

Discussion

We evaluated the influence of sleep hygiene education on the sleep quality of individuals with essential hypertension. We found that sleep hygiene education significantly improved sleep quality. Similar to the present findings of this study, examined the effects of exercise and sleep hygiene in elderly individuals experiencing insomnia (Reid et al., 2010). They found that sleep hygiene education was effective in improving sub scores of PSQI including sleep quality, sleep latency, sleep duration, daytime dysfunctionality, and insomnia. In another study, examined sleep hygiene education in fibromyalgia patients and found statistically significant decreases in PSQI average scores among patients who received sleep hygiene education, notably for sleep duration, sleep latency, and accustomed sleep effectiveness subscales (Edinger et al., 2005).

In their study found that more than half of the study participants (58.2%) who observed sleep hygiene rules had better sleep, and that their average PSQI score was 3.0 ± 1.0 and average total sleep duration was 7.5 ± 0.91 hours (Gellis and Lichstein, 2009). Examining women with breast cancer provided stimulus control, sleep deprivation, and sleep education whereas they provided only sleep hygiene education to the control group (Epstein et al. 2007). After the intervention both groups had decreased total sleep time, time to go to sleep, and sleep latency components, with the group that has undergone multiple interventions only had lower PSQI scores.

Jacobs et al. in 2004 found that sleep hygiene education positively impacted daily sleep habits patients with primary insomnia. The bulk of the evidence in the literature suggests that sleep hygiene education positively influences individuals' sleep quality. The education we provided as part of the current study appears to have increased the awareness of participants, changed negative habits, provided guidance for obtaining higher quality sleep, and helped achieve behavioral change via frequently conducted follow up contacts.

In our study we examined the influence of comorbid conditions on PSQI scores. We found that there was a positive influence of sleep hygiene training irrespective of whether or not patients had comorbid conditions. This finding is in contrast to who found that among adult inpatients, health conditions of the patients, as well as the invasive procedures and operations performed on them in the clinic affected their sleep (Karagözoğlu et al., 2007).

PSQI averages in our study were examined in accordance with the socio-demographic characteristics. We found that the groups did not differ in a statistically significant way ($p > 0.05$), that sleep hygiene education was effective in improving sleep quality in all subgroups, and that all participants benefited from the education to a similar extent.

Conclusion

We found that among patients with essential hypertension, sleep hygiene education was effective in improving PSQI scores in our overall sample, as well as within subgroups based on socio-demographic characteristics. Improvements in sleep quality were similar across groups, with all patient groups benefiting to a similar extent. Thus, we suggest that patients with essential hypertension who complain of sleep disturbance should be offered sleep hygiene education programs.

Conflict of Interest

All authors, named following, approve that they all have made a substantial contribution to the information or material submitted for the publication and all have read and approved the final manuscript, and that they have no substantial direct or indirect commercial financial incentive associated with publishing the article, and that the manuscript or portions thereof are not under consideration by another journal and have not been previously published.

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