Orjinal Araştırma **Van Sağ. Bil. Derg.** *2025; 18(1):55-64.*
Original Research *https://doi.org/10.52976/vansaglik.1614781*

Effects of Acupressure Application on Blood Pressure and Disease-Related Symptoms in Individuals with Hypertension: An Experimental Study

Akupresur Uygulamasının Hipertansiyonu Olan Bireylerde Kan Basıncı ve Hastalığa Bağlı Semptomlara Etkisi: Deneysel Bir Çalışma

Gülden Atan[1], Elanur Yılmaz Karabulutlu[2]

[1] Faculty of Health Sciences, Van Yüzüncü Yıl University, Van, Türkiye

[2] Faculty of Nursing, Atatürk University, Erzurum, Türkiye

Cited: Atan G, Karabulut Yılmaz E. (2025). Effects of Acupressure Application on Blood Pressure and Disease-Related Symptoms in Individuals with Hypertension: An Experimental Study. *Van Sağlık Bilimleri Dergisi*, 18(1), 55-64.

ABSTRACT

Objective: Taking symptoms under control is important to calm the individual with hypertension and reduce complications. This study aimed to determine the effects of acupressure on blood pressure, fatigue, insomnia and headache in patients with hypertension.

Material and Method: The research was an experimental study. Research data were collected between August 2017 and July 2018. The research sample consisted of acupressure intervention groups and a control group with 40 patients in each group for a total of 80 patients. Acupressure applied to their intervention groups for a total of seven sessions of 20 min each over one week, once a day on seven days a week. Data was collected by means of a personal information form, fatigue severity scale, numeric pain scale and Pittsburgh sleep quality index.

Results: In comparison with the control group, a significant reduction was seen over time in the levels of blood pressure, fatigue, headache and insomnia in the acupressure intervention groups ($p<0.05$).

Conclusion: Acupressure interventions were found to effective in reducing levels of blood pressure, fatigue, insomnia and headache. It was seen that in addition to their use in routine nursing care acupressure treatments can be accepted as effective nursing interventions that reduce blood pressure, fatigue, insomnia and headache of patients with hypertension.

Keywords: *Acupressure, Blood pressure, Fatigue, Insomnia, Head pain, Hypertension*

ÖZET

Giriş: Semptomları kontrol altına almak hipertansiyonlu bireyi sakinleştirmek ve komplikasyonları azaltmak için önemlidir. Bu çalışma hipertansiyonlu hastalarda akupresürün kan basıncı, yorgunluk, uykusuzluk ve baş ağrısı üzerindeki etkilerini belirlemeyi amaçlamıştır.

Materyal ve Metot: Araştırma deneysel bir çalışmadır. Araştırma verileri Ağustos 2017 ile Temmuz 2018 arasında toplanmıştır. Araştırma örneklemi akupresür müdahale grupları ve her grupta 40 hasta olmak üzere toplam 80 hastadan oluşan bir kontrol grubundan oluşmuştur. Müdahale gruplarına akupresür, haftada yedi gün, günde bir kez olmak üzere bir hafta boyunca her biri 20 dakikalık toplam yedi seans uygulanmıştır. Veriler kişisel bilgi formu, yorgunluk şiddet ölçeği, sayısal ağrı ölçeği ve Pittsburgh uyku kalitesi indeksi aracılığıyla toplanmıştır.

Bulgular: Kontrol grubuyla karşılaştırıldığında, akupresür müdahale gruplarında kan basıncı, yorgunluk, baş ağrısı ve uykusuzluk seviyelerinde zamanla anlamlı bir azalma görülmüştür ($p<0,05$).

Sonuç: Akupresür müdahalelerinin kan basıncı, yorgunluk, uykusuzluk ve baş ağrısı seviyelerini azaltmada etkili olduğu bulundu. Rutin hemşirelik bakımında kullanılmasına ek olarak akupresür tedavilerinin hipertansiyonlu hastaların kan basıncını, yorgunluğunu, uykusuzluğunu ve baş ağrısını azaltan etkili hemşirelik müdahaleleri olarak kabul edilebileceği görüldü.

Anahtar kelimeler: *Akupresür, Kan basıncı, Yorgunluk, Uykusuzluk, Baş ağrısı, Hipertansiyon*

* *Corresponding author: Gülden Atan. E-mail:* guldenatan@gmail.com
ORCIDS: Gülden Atan: 0000-0001-8816-9537, *Elanur Yılmaz Karabulutlu*: 0000-0001-5798-853X

Received: 07.01.2025, Accepted: 18.03.2025 and Published:30.04.2025

INTRODUCTION

Hypertension is an established risk factor for chronic diseases and has also become a cause of death globally (Gao et al., 2024). Hypertension is drawing serious threat to human health. American Heart Association is emphasized that, hypertension is defined as either a systolic blood pressure measurement everlastingly higher than 129 mmHg or a diastolic blood pressure higher than 89 mmHg (Satapathy et al., 2022).

Patients with hypertension experience a large number of symptoms such as exhaustion, fatigue, headache, tachycardia, dyspnea, ringing in the ears, nasal bleeding, swelling of the legs and insomnia (Mendoza et al., 2022). These symptoms which generally have a negative influence on the patients' quality of life have been shown to be associated with each other (McGrath et al., 2017).

Today, pharmacological and non-pharmacological methods are used in symptom management for hypertension patients (Albulushi et al., 2024). Using antihypertensive drugs is the first line of treatment. Also, traditional Chinese medicine have achieved curative effects in the treatment of hypertension (Zhang et al., 2019). Non pharmacologic therapies are vital in managing symptoms. The pharmacological drugs effects of detrimental are excessive. Therefore, patients prefer nonpharmacological therapies rather than medication. Among these therapies such as aromatherapy, reiki, massage, acupuncture, acupressure and music (Yeni et al., 2022).

Acupressure, which is among non-pharmacological therapies, is one of the ancient healing methods. This method enables the proper functioning of energy channels through applying pressure to acupuncture points with fingers, tennis balls or special stimulation devices in order to activate the power of the body to heal itself, to regulate energy flow and to remove uncomfortable symptoms. Because acupressure and acupuncture have the same working mechanism, the effect is the same (Cha and Park, 2020). Acupressure is a non-invasive, safe, effective and side-effect free method. Its basic feature is to treat the disease by using the organism's own means and removing the symptoms without getting any material to the organism from the outside. Stimulating a few different points effective in the same disease simultaneously can remove a large number of symptoms (Hmwe et al., 2020). Acupressure is used frequently by nurses as a clinical and comprehensive nursing intervention (Khanghah et al., 2019). It is stated that it should be included in care plans of nurses, especially due to being a complementary-alternative method in symptom control (Mai et al., 2022).

In recent years, the use of acupressure in the management of symptoms has increased worldwide. Acupressure has been found to relieve symptoms in patients with hypertension and for therapeutical purposes by showing a regulating effect on blood pressure (Kim et al., 2013; Yeh et al., 2015; Lin et al., 2016).

Some randomized controlled studies show that acupressure decrease both systolic and diastolic blood pressure, removing headache, fatigue, sleep problems (Kim et al., 2013; Simoncini et al., 2015; Yeh et al., 2015; Wang et al., 2017; Waits et al., 2018; Sokunbi et al., 2020; Lu et al., 2022; Chang et al., 2024).

When the literature is reviewed, although there are a great number of studies which have examined the effects of acupressure in different disease groups, no studies have been found in our country about acupressure in hypertension patients (Zeng et al., 2016; Waits et al., 2018; Sokunbi et al., 2020; Turkmen and Turfan, 2020; Alinaghizadeh et al., 2021; Kucukkelepce et al., 2021; Korelo et al., 2022; Mai et al., 2022; Lu et al., 2022; Chang et al., 2024).

The aim of the present study was to determine the effects of acupressure on blood pressure, fatigue, insomnia and headache in patients with hypertension.

Hypotheses 1. Acupressure interventions have an effect on blood pressure, fatigue, insomnia and headache fatigue level of patients with hypertension.

Hypothesis 0. Acupressure interventions have no effect on blood pressure, fatigue, insomnia and headache fatigue level of patients with hypertension.

MATERIAL and METHOD

Study Design and Participants

The study was conducted as an experimental study with repetitive measurement, randomized design and experimental and control group.

The population consisted of 450 patients diagnosed with hypertension who referred to cardiology polyclinic of a university hospital. The patients who did not meet the research criteria were excluded, 280 were left. 170 of these patients refused to participate in the study were excluded from the list. Of 110 patients, 30 refused to participate. The study was completed with the remaining 80 patients. The sample size was appropriate as 40 patients in each group with a calculation based on 80% statistical power, 0.10 effect size and 0.05 margin of error. The study was conducted with 40 in the experimental group and 40 in the control group, who met the inclusion criteria and agreed to participate in the study.

Hypertension patients who met the following conditions were included in the study: Hypertension patients who met the following conditions were included in the study: (1) a diagnosis of hypertension; (2) uses antihypertensive; (3) 18 years of age or older; (4) no communication problem; (5) a status of 5 or more on the Pittsburgh sleep quality index total score of 5 and higher; (6) a status of 27 or more on the fatigue severity index total score of 5 and higher; (7) a score of 4 or more on the numerical pain scale; (8) no burns, scars, cuts or scratches, or deformities in

the area where acupressure would be applied; (9) have not had acupressure previously; (10) conscious; (12) no psychological illness; and (13) agreed to participate in the research.

Ethical Approval

Ethical approval was obtained from an ethics committee within the scope of the study (Date: 08.08.2017, Ethics committee no: 2017-8/4).

Data Collection Tools

Personal information form, fatigue severity index, numerical pain scale, Pittsburgh sleep quality and blood pressure follow-up form index were used for data collection.

Personal Information Form

This form includes questions to find out descriptive and disease related characteristics of the patients.

Fatigue Severity Index

This scale was developed by Krupp et al. Each question is graded between 1 and 7 (Simoncini et al., 2015). While the total score differs between 9 and 63, a total score of 27 and higher shows that there is fatigue. An increase in total score means increase in fatigue severity. The higher the total score is the higher fatigue is. Individuals are asked to tell the options which fit them by considering their states within the past week. Fatigue severity index has shown acceptable internal consistency, validity and sensitivity to clinical changes. The Turkish validity and reliability of the scale was confirmed in a study by Armutlu et al. They found the Cronbach Alpha internal consistency coefficient of the scale as 0.89 (Armutlu et al., 2017). Cronbach Alpha was for this study as 0.809.

Numerical Pain Scale

This method used in finding out pain severity aims to make the patient explain pain with numbers. It is frequently used in clinic due to being easy to apply. Numerical pain scale includes numbers gradually increasing placed on a line with specific intervals. In the scale, absence of pain starts with (0) and reaches the level of unbearable pain (10) (Aslan,2002).

Pittsburgh Sleep Quality Index

PSQI was developed by Buysse et al. It is a scale which gives information about sleep quality and sleep problems within the past month and it can be used easily and commonly both for clinic and research purposes (Buysse et al., 1989). While 19 of the 24 questions of the scale are answered by the individual, 5 questions are answered by the individual's friend, if there is. The last 5 questions are not included in the scoring. Only the 19 questions answered by the individual are taken into consideration in the assessment. Each item in the scale is scored as 0 (no problem) -3 (serious problem). Total scores of the seven sub-dimensions differ between 0 and 21 and give the total PSQI score. Agargun conducted the Turkish validity and reliability study of the scale in our country (Agargun et al., 1996). Cronbach alpha value of the Turkish validity and reliability study is 0.80, for this study, cronbach alpha was found as 0.802.

Blood Pressure Follow-Up Form

This form, which was created by the researchers, records the total weekly blood pressure and as well as the times of measurement.

Procedures

During the study, the routine treatment of the patients in all two groups was continued. In support of their routine treatment, a total of seven sessions of acupressure were conducted with the patients of the intervention (Acupressure) group, with seven sessions a week, once a day, over one week. Each session lasted 20 min. All sessions were held by the same researcher (G.A.). However, no intervention was made to the control group. The researcher took part in 16 h of Acupressure training, four hours a day for four days. Previous studies in the literature were examined, and an acupressure intervention protocol was prepared in line with the views of an expert (Zeng et al., 2016; Wang et al., 2017; Alinaghizadeh et al., 2021).

At the first meeting, information was given to the patients regarding the aim of the research. Participants were given 15 minute to decide whether to participate in this study. The researchers obtained written approval from the patients. Patients who agreed to participate in the research were assigned to an intervention group (Acupressure) or the control group. The patients who came to the polyclinic on the same days of the week were taken in the same group. The patient description form was completed by the researchers.

Intervention

Acupressure Group

The researcher (GA) applied acupressure. In order to contact information was taken by the researcher. Groups of 4-5 were formed for the acupressure application. The groups were arranged according to the patients were available. The groups were arranged Monday-Sunday and Tuesday-Monday. 8 patients stopped acupressure application. 8 new patients were taken again to complete the sample group.

The first acupressure intervention was conducted in a predetermined room in the hospital after conditions not disturbing the patients (sound, light…) were met. The other sessions were made in the patients' homes. Home addresses of the participants selected for this study were obtained from the hospital records. Before each acupressure application session, the patients' blood pressures were measured and recorded. The major acupoints for this study was Ht7- Shenmen (insomnia), LI4- Hegu (headache) and St36-Zusanli (fatigue). The protocol of acupressure was prepared with the expert was prepared with the expert (as shown in the steps of acupressure). Acupressure applied to their intervention groups for a total of

seven sessions of 20 min each over one week, once a day on seven days a week. Acu points receiving the intervention were as follows Fig. 1.

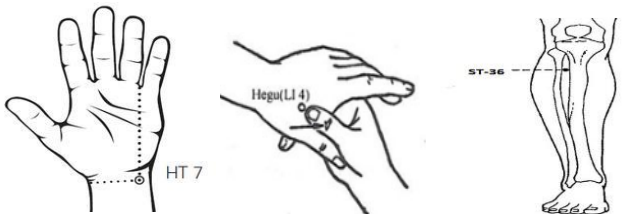

Figure. 1. Acupressure application points.

Steps of Application Acupressure

1.Wash hands before application.

2. The patient is given suitable position.

3. Before applying direct pressure on each point, preparative taps are made to each point for about 10 seconds in order to loosen the point area, to relax the soft tissue and to decrease tension by increasing local blood build up.

4. Pressure are applied by the researcher for 2 minutes.

5. Symmetrically, pressure is applied to each acupressure point.

6. While applying pressure, care are taken for the individual's sensitivity (threshold of pain) not to create tissue damage.

7. The repetitive pressures on each point are made with a frequency which did not disturb the individual and did not cause pain.

8. All applications are made every day at the same period of time.

9. 10 minutes after acupressure intervention ended, the patients' blood pressures are measured again and recorded.

10. The hands are washed and the application is recorded.

Control Group

In the control group patients, no intervention was made expect for their routine treatment during the study. While their pre-test data were being taken at the first meeting, the patients were explained that he same practices would be conducted in the hospital or in their home on day 7. 7 days later, their post-test data (PIF, FSI, NPS and PSQI) were collected and their blood pressures were measured and recorded. The Fig. 2. depicts the research plan.

RESEARCH PLAN Determination of patients who meet the research criteria Sample of the study (n=80)	
ACUPRESSURE GROUP (n=40)	**CONTROL GROUP (n=40)**
Pre-Test - Informing patients about the study and obtaining informed consent - PIF - FSI - NPS - PSQI	**Pre-Test** - Informing patients about the study and obtaining informed consent - PIF - FSI - NPS - PSQI
Acupressure Application Total of seven sessions.	No acupressure.
Post-Test (At the end of session seven) - FSI - NPS - PSQI	**Post-Test (At the end of session seven)** - FSI - NPS - PSQI

Figure. 2. Research plan.

Statistical Analysis

Statistical analysis was performed using SPSS 25.0 statistical software (IBM, Armonk, New York, USA). The data obtained are presented as arithmetic mean, standard deviation, number, percentage, minimum-maximum value. As well as $\chi 2$ analysis for the comparison of the 2 groups' demographic characteristics (categorical measurements), independent-group t test and Mann-Whitney U test for the comparison of the groups' systolic blood pressure, diastolic blood pressure, fatigue severity index, numerical pain scale and pittsburgh sleep quality index scores, dependent-groups variance analysis and Will Coxon test for inter group comparisons, and Cronbach's α coefficients for internal consistency.

RESULTS

Variables of the patients in the experimental group and control group were compared in Table 1. Except for the rates of cigarette use ($p=0.01$) control variables of the patients in the experimental and the control group are similar to each other ($p>0.05$).

Table 1. Comparison of descriptive characteristics of groups

		Experimental		Control		Significance
		n	**%**	**n**	**%**	
Gender	Female	23	57.5	18	45.0	x^2=1.251, p=0.263
	Male	17	42.5	22	55.0	
Educational level	Literate	7	17.5	5	12.5	x^2=4.511, p=0.341
	Illiterate	19	47.5	15	37.5	
	Primary	12	30.0	13	32.5	
	Secondary	2	5.0	4	10.0	
	High school	-	-	3	7.5	
Marital status	Single (Single or divorced…)	4	10.0	1	2.5	p=0.359*
	Married	36	90.0	39	97.5	
Profession	Officer/Worker	2	5.0	1	2.5	x^2=7.019, p=0.135
	Retired	5	12.5	9	22.5	
	Housewife	23	57.5	18	45.0	
	Unemployed	8	20.0	4	10.0	
	Other	2	5.0	8	20.0	
Cigarette	Yes	2	5.0	11	27.5	x^2=8.367, p=**0.015**
	No	29	72.5	19	47.5	
	Quit	9	22.5	10	25.0	
Alcohol	No	40	100	39	97.5	p=1.000*
	Quit	-		1	2.5	
Duration of illness	6-12 months	1	2.5	2	5.0	x^2=0.377, p=0.945
	1-5 years	12	30.0	11	27.5	
	6-9 years	16	40.0	16	40.0	
	≥10 years	11	27.5	11	27.5	
Regular drug use	Yes	36	90.0	38	95.0	p=0.675*
	No	4	10.0	2	5.0	
Frequency of having BP measured	Every day	2	5.0	5	12.5	x^2=4.161, p=0.125
	One in a while	25	62.5	29	72.5	
	Never	13	32.5	6	15.0	
		$\bar{X}$± SD		**$\bar{X}$± SD**		
Age (years)		60.43± 11.47		57.13± 9.78		t=1.385, p=0.170

*p<0.05; *Fisher's exact Chi-square test; *Mann Whitney- U test; HT: hypertension; BP: blood pressure.

In Table 2, pre-acupressure fatigue, insomnia, pain scales were found to be higher in the experimental scores and blood pressures of the patients in the two groups (p=0.031, p=0.002, p=0.000). groups were compared, DBP, NPS and PSQI average

Table 2. Comparison of pre-intervention values of patients in the experimental and control group between groups

	n	**Acupressure group (n=40)**			**Control group (n=40)**			
		Min.	**Max.**	**$\bar{X}$± SD**	**Min.**	**Max.**	**$\bar{X}$± SD**	**Test & p***
SBP	40	130	200	152.00± 18.84	130	170	144.88± 12.48	U=643.500, p=0.124
DBP	40	70	180	95.75± 17.23	70	110	88.38± 10.88	U=585.000 **p=0.031**
FSI	40	38.00	63.00	55.55±5.99	30.00	63.00	54.83± 6.79	U=756.500 p=0.675
NPS	40	4.00	9.00	6.60±1.19	4.00	8.00	5.80± 1.02	t=3.225 p=**0.002**
PSQI	40	7.00	18.00	13.35±2.38	8.00	14.00	11.28± 1.81	t=4.387 p=**0.000**

*p<0.05; *Mann Whitney- U test, BP: blood pressure, SBP: systolic blood pressure, DBP: diastolic blood pressure, FSI: fatigue severity index, NPS: numerical pain scale, PSQI: Pittsburgh sleep quality index, SD: standard deviation.

When the intragroup SBP and DBP values of two groups were compared in Table 3; the difference between pre and post-acupressure SBP and DBP of the patients in two groups was found to be statistically significant ($p<0.05$ for each). It was found that post-test blood pressure values of the experimental group decreased in all measurements, while post-test blood pressure values of the control group patients were found to increase (Table 3).

Table 3. Comparison of pre and post-test values of patients

Groups		Measurement	Pre-test	Post-test	Test & p*
			$\bar{X}$± SD	$\bar{X}$± SD	
Acupressure group	SBP	First	152.00± 18.84	143.75± 16.44	t=6.983, p=**0.000**
		Second	150.75± 13.47	142.75± 11.54	t=4.853, p=**0.000**
		Third	151.50± 15.94	143.50± 14.06	t=5.551, p=**0.000**
		Fourth	146.25± 11.92	139.25± 8.88	t=6.121, p=**0.000**
		Fifth	148.75± 14.36	141.88± 10.72	t=5.394, p=**0.000**
		Sixth	145.50± 10.85	141.75± 10.10	t=2.644, p=**0.012**
		Seventh	146.00± 12.57	141.75± 9.03	Z=-2.769, p=**0.005**
	DBP	First	95.75± 17.23	86.88± 14.88	t=7.047, p=**0.000**
		Second	90.50± 8.46	84.75± 10.62	t=3.433, p=**0.001**
		Third	92.25± 8.77	86.38± 8.62	t=4.693, p=**0.000**
		Fourth	87.88± 6.49	83.25± 7.97	t=4.116, p=**0.000**
		Fifth	90.00± 7.76	82.88± 10.18	t=6.007, p=**0.000**
		Sixth	90.00± 7.16	82.13± 7.06	t=6.565, p=**0.000**
		Seventh	88.75± 8.22	81.75± 8.66	t=6.048, p=**0.000**
Control group	SBP	First	144.88± 12.48	148.75± 13.06	t=4.244, p=**0.000**
	DBP	Second	88.38± 10.88	93.00± 9.79	Z=-2.143, p=**0.032**

*p<0.05; *Z = Will Coxon Test; SBP: systolic blood pressure, DBP: diastolic blood pressure, SD: standard deviation

Intragroup comparisons of FSI, NPS and PSQI pre and post-test score averages of the patients in the experimental and control group and intergroup of post-test score averages are shown in Table 4.

Statistically significant difference was found between the FSI pre-test (55.55± 5.99; p=0.610) and FSI post-test score averages (45.93± 4.27; p=0.000); NPS pre-test (6.60± 1.19; p=0.000) and post-test score averages (4.25± 1.28; p=0.000) and PSQI pre-test (13.35± 2.38; p=0.000) and post-test score averages (7.80± 2.02; p=0.000) of the patients in the experimental groups (p=0.000). The difference between NPS pre-test (5.80± 1.02) and post-test score averages (6.45± 1.54) of the control group was found to be statistically significant (p<0.05; Table 4). Also it was determined that the NPS post-test mean score increased.

When the post-test score values were compared between the two groups, SBP post-test score average of the experimental group (141.75± 9.03) was found to be lower than control group post-test SBP score average (148.75±13.06) (p>0.05 for each). Experimental group DBP post-test score average (81.75± 8.66) was found to be less than control group post-test DBP score average (93.00± 9.79) (p=0.032). There was a significant difference between post-test FSI score average of the experimental (45.93± 4.27) and control group (55.58± 4.84) (p=0.000 and p=0.610) and control group fatigue score averages were higher. A significant difference was also found between NPS score averages of the experimental (4.25± 1.28) and control groups (6.45± 1.54) was found to be statistically significant (p=0.000 and p=0.037). Pain score averages of the control group were higher. Post-test PSQI total score averages of the experimental group (7.80± 2.02) were less than of the control group (10.95± 2.76) (p=0.000 and p=0.537; Table 4).

Table 4. Intragroup and intergroup comparison of scores of the patients

		Pre test	Post test	Test & p*
		$\bar{X}$± SD	$\bar{X}$± SD	
SBP	**Acupressure group**	152.00± 18.84	141.75± 9.03	
	Control group	144.88± 12.48	148.75± 13.06	t=4.244 p=**0.000**
	Test & p*		t=-2.791 p=**0.007**	
DBP	**Acupressure group**	95.75± 17.23	81.75± 8.66	
	Control group	88.38± 10.88	93.00± 9.79	Z=-2.143 p=**0.032**
	Test & p*		U=329.000 p=**0.000**	
FSI	**Acupressure group**	55.55± 5.99	45.93± 4.27	t=14.213 p=**0.000**
	Control group	54.83± 6.79	55.58± 4.84	Z=-0.510 p=0.610
	Test & p*		U=120.000 p=**0.000**	
NPS	**Acupressure group**	6.60± 1.19	4.25± 1.28	t=17.206 p=**0.000**
	Control group	5.80± 1.02	6.45± 1.54	t=-2.161 p=**0.037**
	Test & p*		t=-6,970 p=**0.000**	
PSQI	**Acupressure group**	13.35± 2.38	7.80± 2.02	t=13.703 p=**0.000**
	Control group	11.28± 1.81	10.95± 2.76	t=0.623 p=0.537
	Test & p*		t=-5.824 p=**0.000**	

*p<0.05; *Z = Will Coxon Test; SBP: systolic blood pressure, DBP: diastolic blood pressure, FSI: fatigue severity index, NPS: numerical pain scale, PSQI: Pittsburgh sleep quality index, SD: standard deviation.

DISCUSSION

In this section, the results of the present study, which was conducted to find out the effects of acupressure application on hypertension patients' blood pressures, fatigue, insomnia and headache symptoms, were discussed. Both SBP and DBP were found to decrease after each acupressure session in the experimental group when compared to the initial SBP and DBP results.

SBP and DBP post test results of the patients in the experimental group were found to be lower when compared with the patients in the other group. These results confirm hypothesis 1. In their randomized controlled studies, they concluded that acupressure decreased both systolic and diastolic blood pressure in hypertensive patients and that further studies were needed to assert that using it as a subsidiary care to antihypertensive treatment for this patient group could be useful in increasing quality of life and to determine the suitable acupressure application time (Kim et al., 2013; Yeh et al., 2015; Lin et al., 2016;). The results of different studies conducted on stroke patients and patients receiving invasive mechanical ventilation support have also concluded that acupressure is effective in decreasing blood pressure (Cingolani et al., 2019).

Fatigue levels of the experimental group were found to decrease following acupressure application. Fatigue levels of the patients in the experimental group were found to be less than those of the patients in the control group. These results support the research hypothesis 1. Studies about the effects of acupressure on fatigue have also reported that fatigue symptom decreased significantly with this practice (Kim et al., 2013; Simoncini et al., 2015; Yeh et al., 2015; Lin et al., 2016; Wang et al., 2017; Waits et al., 2018; Sokunbi et al., 2020; Korelo et al., 2022; Lu et al., 2022; Mai et al., 2022;). A meta-analysis study conducted in 2024 also stated that acupressure was effective in relieving patients' fatigue levels, similar to our findings (Chang et al., 2024). In a randomized controlled study conducted it was reported that acupressure had positive effects in removing fatigue (Çeçen and Lafcı, 2021). We can say that acupressure is effective in alleviating fatigue in patients receiving hypertension, particularly when the Shenmen acupoint is used together with other acupoints and is effective without the application of special equipment.

It was seen that the patients in the experimental group had less headaches, and they had very low headache scores when compared with patients in the control group. The outcomes of present study confirm the

research hypothesis 1. In a study, it was reported that acupressure is an effective method for headaches (Lu et al., 2022). In other studies, it has been supported that acupressure is effective in decreasing pain in cancer patients, and pain due to acute skeletal muscle injury, labor pain resulting from neck and shoulder nerve destruction, pain due to intramuscular injection and back aches (; Tan et al., 2021; Dragomon et al., 2022; Mai et al., 2022; Behkam,2024).

It was seen that the patients in the experimental group had decreased insomnia problems and experienced less insomnia than patients in the control group following acupressure application. These results confirm hypothesis 1. No studies were found about the effects of acupressure on hypertension patients in the literature review. For this reason, the results of the study were discussed with the results of studies on different patient groups. In literature, it has been reported that acupressure decreases insomnia significantly (Waits et al., 2018; Yeung et al., 2022). In addition, in the randomized controlled studies they conducted that acupressure was effective in solving sleep problem (Wang et al., 2017; Sokunbi et al., 2020). In addition, it has also been found that acupressure increases sleep quality in Alzheimer patients and patients with renal disease (Simoncini et al., 2015). Similar results were obtained in a study conducted in Indonesia in 2024. The study was conducted that acupressure release neurotransmitters such as serotonin and activate the opioid system. Therefore, by producing body relaxation, it can improve sleep quality. The massage points, especially on the shoulder, neck, or head area itself can produce varying degrees of body relaxation and thus result in a better quality of sleep. In addition, this can be due to the mental effects and emotional effects of massage (Yuniarsih et al., 2024). This studies have mentioned that further studies are required to find out whether the same effect exists for different patient groups.

The research is limited to the patients who received cardiology polyclinic, and the results of this study cannot be generalized to patients outside the study group.

Conclusion

In study, it was shown that acupressure is effective in decreasing both systolic and diastolic blood pressure, fatigue, insomnia and headache of hypertension patients. For this reason, it is recommended for health professionals to be encouraged to use acupressure with pharmacological methods in order to decrease symptoms such as fatigue, headache and insomnia which have a negative influence on hypertension patients' blood pressure and the patients' quality of life.

It was found that integrative methods of symptom management should be routinely integrated into nursing practice. Acupressure is the one of integrative methods and simple to use and inexpensive. Also, acupressure is non-invasive applications so it can also be incorporated in nursing care. When nurses use acupressure, it will help improve the quality of nursing care. Future studies with larger sample sizes are recommended to generalize the findings.

Conflict of interest: The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Author contributions

Conceptualization GA, EYK; Data curation GA, Formal analysis GA, EYK; Methodology GA,EYK; Software GA; Supervision EYK; Validation GA, EYK; Visualization GA,EYK; Roles/Writing - original draft GA; Writing - review and editing EYK

Ethical approval: Ethical approval was obtained from an ethics committee within the scope of the study (Date: 08.08.2017, Ethics committee no: 2017-8/4).

REFERENCES

Agargun MY, Kara H, Anlar O. (1996). The validity and reliability of the Pittsburgh Sleep Quality Index. *Turk Psikiyatri Dergisi*, 7(2), 107-115.

Albulushi A, De Silva TD, Kashoub M, Tawfek A, Shams A, Al-Riyami A, et al. (2024). Expanding horizons in pulmonary hypertension management: A systematic review and meta-analysis of non-pharmacological interventions. *Current Problems in Cardiology*, 102825.

Alinaghizadeh M, Hawkins J, Abbassian A, Ayati MH. (2021). Effect of Persian acupressure (Ghamz) on patients with knee osteoarthritis: A single-blinded parallel clinical trial. *Pain Management Nursing*, 22(6), 820-827.

Armutlu K, Korkmaz NC, Keser I, Sumbuloglu V, Akbiyik DI, Guney Z,et al. (2007). The validity and reliability of the Fatigue Severity Scale in Turkish multiple sclerosis patients. *International Journal of Rehabilitation Research*, 30(1), 81-85.

Aslan FE. (2002). Pain assessment methods. *Cumhuriyet University Journal of Nursing*, 6, 9-16.

Behkam S.(2024). Exploring acupuncture and its effects on chronic headache and musculoskeletal pain: A comprehensive narrative review. *International Journal of Musculoskeletal Pain Prevention*, 9(2), 1012-1018.

Buysse DJ, Reynolds CF, Monk TH, Berman SR, Kupfer DJ. (1989). The Pittsburgh Sleep Quality Index: a new instrument for psychiatric practice and research. *Psychiatry Research*, 28(2), 193-213.

Cha HS, Park H.(2020). Effects of auricular acupressure on Korean children who are obese. *Journal of Pediatric Nursing*, 51, e57-e63.

Chang KM, Romadlon DS, Pin-Yuan CHEN, Hasan F, Shu-Liu GUO, Hsiao-Yean CHIU. (2024). Effectiveness of acupressure for fatigue alleviation in patients receiving hemodialysis: a systematic review and meta-analysis of randomized controlled trials. *Journal of Nursing Research*, 32(3), e334.

Cingolani OH. (2019). Cardiovascular risks and organ damage in secondary hypertension. *Endocrinology and Metabolism Clinics*, 48(4), 657-666.

Çeçen S, Lafcı D. (2021). The effect of hand and foot massage on fatigue in hemodialysis patients: A randomized controlled trial. *Complementary Therapies in Clinical Practice*, 43, 101344.

Dragoman M, Fofie C, Bergen S, Chavkin W. (2022). Integrating self-managed medication abortion with medical care. *Contraception*, 108, 1-3.

Gao G, Chen Z, Yan G, Bao M. (2024). Impact of hypertensive heart disease, risk factors, and age-period-cohort models across 204 nations and regions from 1990 to 2019: A global perspective from the 2019 global burden of disease study. *Frontiers in Cardiovascular Medicine*, 11, 1417523.

Hmwe NTT, Browne G, Mollart L, Allanson V, Chan SWC. (2020). Older people's perspectives on use of complementary and alternative medicine and acupressure: a qualitative study. *Complementary Therapies in Clinical Practice*, 39, 101163.

Khanghah AG, Rizi MS, Nabi BN, Adib M, Leili EKN. (2019). Effects of acupressure on fatigue in patients with cancer who underwent chemotherapy. *Journal of Acupuncture and Meridian Studies*, 12(4), 103-110.

Kim JH, Jung HJ, Kim TH, Lee S, Kim JE, Kang KW et al. (2013). Auricular acupuncture for prehypertension and stage 1 hypertension: study protocol for a pilot multicentre randomised controlled trial. *Trials*, 14, 1-7.

Korelo RIG, Moreira NB, de Carvalho Miguel BA, da Cruz CDG, de Souza NSP, de Macedo RMB et al. (2022). Effects of Auriculotherapy on treatment of women with premenstrual syndrome symptoms: A randomized, placebo-controlled clinical trial. *Complementary Therapies in Medicine*, 66, 102816.

Krupp LB, LaRocca NG, Muir-Nash J, Steinberg AD. (1989). The fatigue severity scale: application to patients with multiple sclerosis and systemic lupus erythematosus. *Archives of Neurology*, 46(10), 1121-1123.

Kucukkelepce DS, Unver H, Nacar G, Tashan ST. (2021). The effects of acupressure and yoga for coping with premenstrual syndromes on premenstrual symptoms and quality of life. *Complementary Therapies in Clinical Practice*, 42, 101282.

Lin GH, Chang WC, Chen KJ, Tsai CC, Hu SY,Chen LL. (2016). Effectiveness of acupressure on the Taichong acupoint in lowering blood pressure in patients with hypertension: a randomized clinical trial. *Evidence-Based Complementary and Alternative Medicine*, 2016(1), 1549658.

Lu TT, Lu CC, Li MX, Ke LX, Cai H,Yang KH. (2022). Reporting and methodological quality of meta-analyses of acupuncture for patients with migraine: a methodological investigation with evidence map. *Journal of Integrative Medicine*, 20(3), 213-220.

Mai Q, Li X, Yang D, Zhang X, Peng K, Hao Y. (2022). Effects of acupressure on cancer-related pain management: A systematic review and meta-analysis of randomized controlled trials. *European Journal of Integrative Medicine*, 51, 102120.

Mc Grath ER, Espie CA, Power A, Murphy AW, Newell J, Kelly C, et al. (2017). Sleep to lower elevated blood pressure: a randomized controlled trial (SLEPT). *American Journal of Hypertension*, 30(3), 319-327.

Mendoza JA, Lasco G, Renedo A, Palileo-Villanueva L, Seguin M, Palafox B et al. (2022). (De) constructing 'therapeutic itineraries' of hypertension care: A qualitative study in the Philippines. *Social Science & Medicine*, 300, 114570.

Satapathy SP, Panda SK, Panda PC, Lakra K, Panda SC, Dhawan P et al. (2022). Association of tobacco with hypertension in adult females: Evidence from National Family Health Survey-IV for an aspirational Indian state. *Clinical Epidemiology and Global Health*, *15*, 101061.

Simoncini M, Gatti A, Quirico PE, Balla S, Capellero B, Obialero R,et al. (2015). Acupressure in insomnia and other sleep disorders in elderly institutionalized patients suffering from Alzheimer's disease. *Aging Clinical and Experimental Research*, 27, 37-42.

Sokunbi G, Takai IU, Nwosu IB, Balarabe R. (2020). Effects of acupressure and acupuncture-like transcutaneous electrical nerve stimulation on sleep quality among pregnant women. *Journal of Acupuncture and Meridian Studies*, 13(6), 180-186.

Tan JYB, Wang T, Kirshbaum MN, Zhao I, Eliseeva S, Polotan MJ et al. (2021). Acupoint stimulation for cancer-related fatigue: A quantitative synthesis of randomised controlled trials. *Complementary Therapies in Clinical Practice*, 45, 101490.

Waits A, Tang YR, Cheng HM, Tai CJ,Chien LY. (2018). Acupressure effect on sleep quality: a systematic review and meta-analysis. *Sleep Medicine Reviews*, 37, 24-34.

Wang Z, Hu X, Su J, Gao X, Xu N, Xing Y et al. (2017). The efficacy and safety stimulating a single acu-point shenmen (HT 7) for managing insomnia: A systematic review of randomized controlled trials. *European Journal of Integrative Medicine*, 15, 17-22.

Yeh ML, Chang YC, Huang YY, Lee TY. (2015). A randomized controlled trial of auricular acupressure in heart rate variability and quality of life for hypertension. *Complementary Therapies in Medicine*, 23(2), 200-209.

Yeni K, Tulek Z, Terzi M. (2022). Effect of self-acupressure on fatigue in patients with multiple sclerosis. *Complementary Therapies in Clinical Practice*, 47, 101572.

Yeung WF, Yu BYM, Chung KF, Zhang ZJ, Lao L, Ho FYY et al. (2022). Self-administered acupressure for insomnia disorder: a randomized controlled trial. *Phytomedicine*, 99, 153993.

Yuniarsih SM, Hasanah N, Martani RW, Afifah U. (2024). The effect of self-acupressure on reducing blood pressure, headache and sleep quality disorders in hypertensive patients. *International Journal of Islamic and Complementary Medicine*, 5(2), 168-176.

Zeng H, Liu M, Wang P, Kang J, Lu F, Pan L. (2016). The effects of acupressure training on sleep quality and cognitive function of older adults: a 1-year randomized controlled trial. *Research in Nursing & Health*, 39(5), 328-336.

Zhang Q, Bai C, Chen Z, Li P, Wang S, Gao H. (2019). Smart Chinese medicine for hypertension treatment with a deep learning model. *Journal of Network and Computer Applications*, 129, 1-8.