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Effect of Turkish classical music on blood pressure: A randomized controlled trial in hypertensive elderly patients

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KEYWORDS
Anxiety;
Elderly;
Hypertension;
Music Therapy;
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Summary
Background: Existing studies suggest that music therapy can have favorable effects on hypertension and anxiety. We therefore set out to investigate the effect of Turkish classical music.
Objectives: To investigate whether Turkish classical music has positive effects on blood pressures and anxiety levels in elderly patients.
Design, setting and subjects: This was a randomized controlled trial performed on 60 hypertensive patients living in a local elderly home in Adana, Turkey.
Methods: Following the completion of a socio-demographic form for each patient, Hamilton anxiety scale was applied. Thereafter, the subjects were randomly divided into two equal-size groups and were allowed to either listen to Turkish classical music (music therapy group) or have a resting period (control group) for 25 min.
Outcome measures: The primary and secondary outcome measures were blood pressure and Hamilton anxiety scale scores, respectively.
Results: The mean reduction in systolic blood pressure was 13.00 mmHg in the music therapy group and 6.50 mmHg in the control group. The baseline adjusted between treatment group difference was not statistically significant (95% CI 6.80–9.36). The median reductions in diastolic blood pressures were 10 mmHg both in the music therapy and control groups. The between treatment group difference was not statistically significant (Mann–Whitney *U* test, $P = 0.839$). The mean reduction in HAMA-A was 1.63 in the music therapy group and 0.77 in the control group. The baseline adjusted between treatment group difference was not statistically significant (95% CI 0.82–1.92).
Conclusion: The study demonstrated that both Turkish classical music and resting alone have positive effects on blood pressure in patients with hypertension.

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Introduction

It has been known for several decades that hypertension is one of the major risk factors for cardiovascular morbidity and mortality.[1] The prevalence of hypertension has been shown to range between 25 and 55 percent in the epidemiological studies conducted to date.[2] Specifically for Turkey, PATENT study has demonstrated that the prevalence of hypertension among adults is 31.8 percent across the country.[3] Obviously, hypertension is a serious worldwide health problem pending effective treatment by health professionals.

Due to the high expenditure and various adverse effects of drugs and the presence of drug-resistant hypertensive patients, it was suggested that non-pharmacological interventions in support of the classical therapies are necessary at least for those irresponsive to standard procedures.[4] In this context, music therapy, utilized as an alternative therapy with regard to different disease states, could be a rational option to lower blood pressure.[5,6] Several studies have demonstrated music exposure to have favorable effects on blood pressure.[7–11] Turkish classical music is a national and traditional music form appreciated by the Turkish people. For this reason, the first aim of the present study was to investigate whether Turkish classical music has a positive effect on blood pressure in hypertensive elderly patients. This particular age group was selected due to the high prevalence of hypertension (75.1%) in the Turkish elderly population.[3] Another reason was that the elderly have many additional disease states forming a basis for multiple drug usage, which in turn brings about increases in drug interactions and adverse effects. A non-pharmacological intervention like music therapy, therefore, could be advantageous in attenuating the drug load of such patients.

In parallel with the purpose of the study, participants were selected from the individuals living in an elderly home. This approach had led us to control the confounding factors derived from daily activities, which have the capacity to influence the efficacy of music therapy on hypertension. The similarities in daily life activities (Watching television, playing card games, and resting and walking in the garden) of elderly home residents formed the basis for this approach. On the other hand, the fact that the anxiety prevalence of elders living in elderly homes occur in the range of 7—69 percent and that there may be a relationship between blood pressure and anxiety,[12–16] precipitated the second aim of the study, which is the assessment of the effects of music on anxiety state of our patients. The third aim was to demonstrate whether antihypertensive effect of music, if any, has a connection with the effect of music on anxiety.

Materials and methods

Study design and settings

This was a parallel group, randomized controlled trial conducted in a local elderly home in Adana, Turkey. Prior to the study, the approvals were obtained from the Ethics Committee of Gaziantep University and the Ministry of Family and Social Policies, Republic of Turkey.

Participants

The eligible volunteer participants were all adults aged 60 or over with hypertension. The bedridden subjects and those with hearing loss or unconscious state were excluded from the study. Each subject gave written consent prior to the study. During the course of the study, two subjects, one due to the departure and the other failing to follow instructions, were replaced by the two new volunteers with similar features.

Study protocol

According to the study flow-chart (Fig. 1), following the enrollment of the participants, they were randomly (simple randomization) assigned to either music or control group ($n = 30$ each). Afterwards, a socio-demographic form with 14 queries were completed and the Hamilton anxiety scale (HAM-A) were applied to the patients in each group. HAM-A was performed in a face-to-face manner so that the subjects could response to all questions in approximately 10 min. The validity and reliability of the scale, introduced by Hamilton in 1959, was confirmed in Turkey by Yazıcı et al.[17] HAM-A is a rating scale developed to quantify the anxiety level and the severity of the symptomatology. It consists of 14 items, each defined by a series of symptoms. Anxious mood, fears, intellectualism, somatic complaints (muscular), cardiovascular symptoms, gastrointestinal symptoms, autonomic symptoms, tension, insomnia, depressed mood, somatic complaints (sensory), respiratory symptoms, genitourinary symptoms, and behavior at interview are the items of HAM-A. Each item is scored on a scale of 0 (not present) to 4 (severe), with a total score range of 0—56, where higher points indicate higher anxiety levels.

After obtaining information regarding socio-demographic features and anxiety levels, subjects were directed to either listen to Turkish classical music (music therapy group) or have a resting period (control group) for 25 min. Subjects in the music therapy group were instructed to rest for at least 5 min in a sitting position prior to the music exposure, enabling blood pressure to reach a stable level. Thereafter, systolic and diastolic blood pressures were measured by a registered nurse with a sphygmomanometer at brachial arteries. Measurements obtained at this point (Day 1) were identified as the ''first measurement''. The subjects were then exposed to a 25-minute session of Turkish classical music (''Nihavent'' and ''Buselik'' mode) in an MP3 format, using headphones in a sitting position. The selection of the music type was inspired by the consultations with specialists working for either the Turkish Music Department of State Conservatory of Gaziantep University or the Traditional Turkish Music Research and Promotion Society. Immediately after the music exposure, the blood pressure measurements were done by the same nurse. The measurements obtained before and after each music exposure were defined as pre-measurement and post-measurement, respectively. The study protocol was a 28-day trial in which the patients of the music therapy group were subject to the same application every day. Post-measurement of day 28 was identified as ''last measurement''. All the same procedures but music listening were applied to those in the

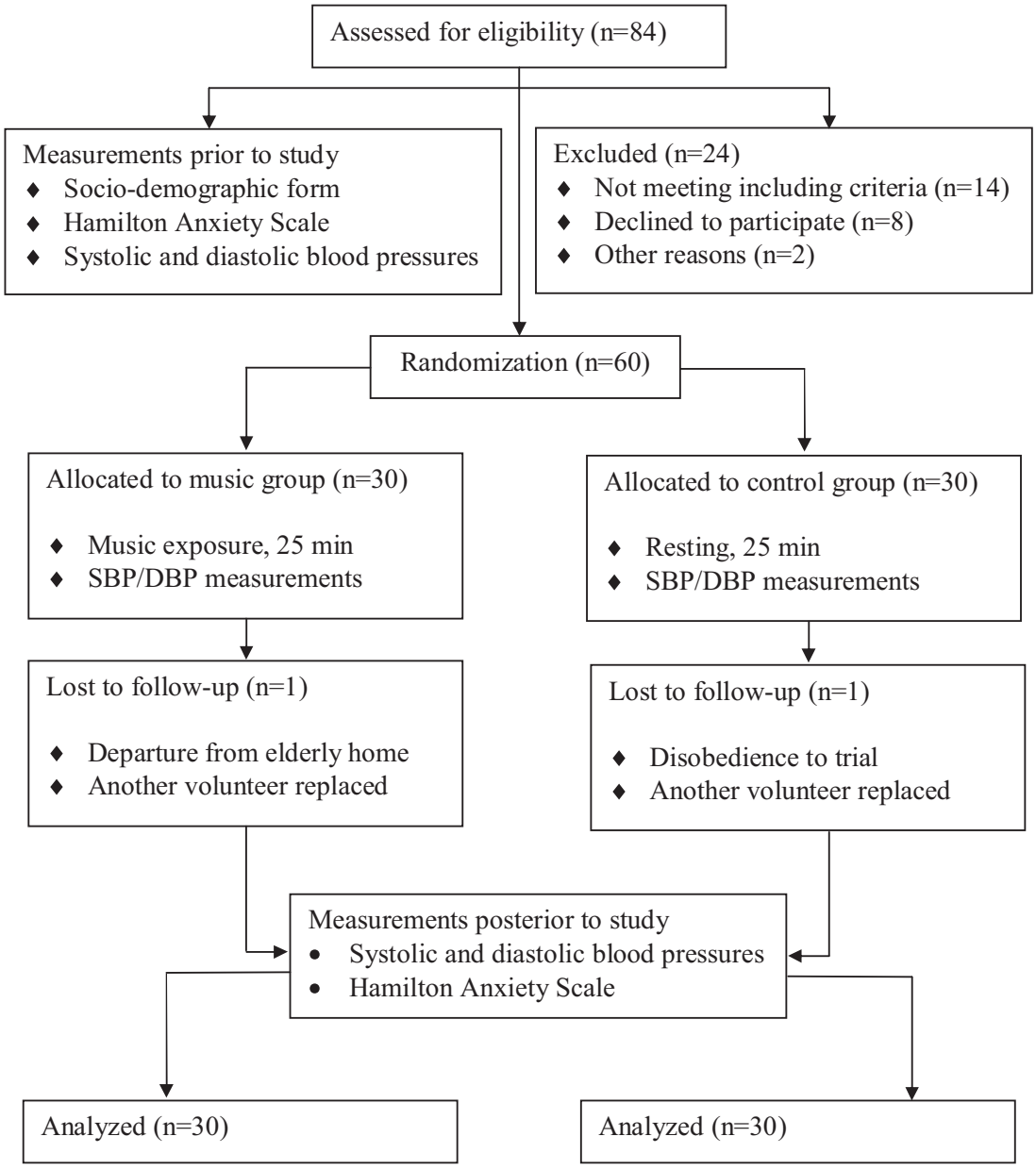

Figure 1 Flow-chart of the study (SBP, systolic blood pressure; DBP, diastolic blood pressure).

control group. They were asked to rest in a sitting position for 25 min without the music exposure and the blood pressures were measured before and after each trial. At the end of the study protocol, each participant was requested to participate in a HAM-A interview.

Statistics

Data were presented as means ± 95% confidence interval and median where appropriate. The analyses were performed by the Statistical Package for Social Sciences (SPSS 8.0, Chicago, IL, ABD). Paired and unpaired Student *t*-tests (Wilcoxon signed-rank and Mann–Whitney *U* tests when normal distribution was lost), chi-squared test, and Pearson-correlation test were used where appropriate. *P* values < 0.05 were accepted to be significant.

Results

Socio-demographic characteristics, prominent information on hypertension, other disease states, and current therapies of the patients are outlined in Tables 1 and 2.

Twenty-eight-day music therapy caused a decrease in systolic blood pressure as shown by the statistically significant difference between the first (Day 1: 128.17 ± 6.72 mmHg) and the last measurements (Day 28: 115.17 ± 5.28 mmHg) (Fig. 2) (Student *t* test, paired, *P* = 0.001). In addition, the statistical comparisons between

Table 1 Sociodemographic characteristics of subjects.

	Group					
	Music		Control		Total	
	n	%	*n*	%	*n*	%
Age (year)						
60—69	6	20.0	2	6.7	8	13.3
70—79	15	50.0	15	50.0	30	50.0
80—89	9	30.0	13	43.3	22	36.7
Gender						
Male	17	57.0	17	57.0	34	57.0
Female	13	43.0	13	43.0	26	43.0
Education						
Illiterate	10	33.3	9	30.0	19	31.7
Literate	1	3.3	1	3.3	2	3.3
Primary school	12	40.0	13	43.3	25	41.7
Secondary school	5	16.7	3	10.0	8	13.3
University	2	6.7	4	13.3	6	10.0
Marital status						
Married	4	13.3	6	20.0	10	16.7
Single	26	86.7	24	80.0	50	83.3
Social security						
Yes	22	73.3	21	70.0	43	71.7
No	8	26.7	9	30.0	17	28.3
Years in elderly home						
1—4	17	56.7	14	46.7	31	51.7
5—8	11	36.7	7	23.3	18	30.0
≥9	2	6.7	9	30.0	11	18.3

pre- and post-measurements were found to be significant in 19 out of 28 days (data not shown). In contrast, there was no significant attenuation in systolic blood pressure in the control group when the first (121.17 ± 5.94 mmHg) and the last measurements (114.67 ± 6.00 mmHg) were compared (Fig. 2) (Student *t* test, paired, $P = 0.184$). Similarly, pre- and post-measurements obtained every single day

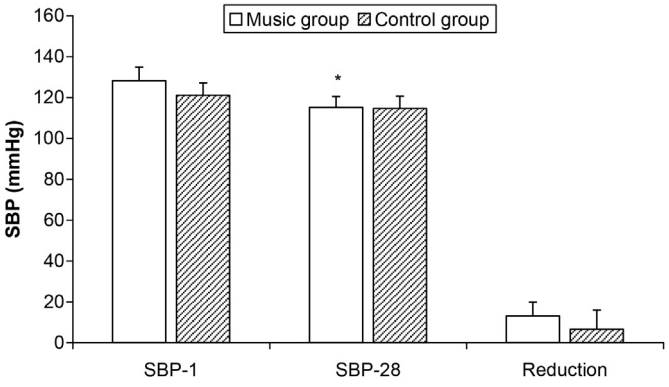

Figure 2 Comparison of systolic blood pressure (mean ± 95% CI) measured at day 1 (SBP- 1) and 28 (SBP-28) in music and control groups. The difference between SBP-1 and SBP-28 (baseline adjusted: SBP-1 minus SBP-28) is presented as reduction. Within group comparisons (SBP-1 vs SBP-28): Student *t* test, paired, *, $P < 0.05$.

Table 2 Characteristics of disease state of subjects.

	Group					
	Music		Control		Total	
	n	%	*n*	%	*n*	%
HT[a] *duration*						
1—5 years	13	43.3	11	36.7	24	40.0
6—10 years	4	13.3	6	20.0	10	16.7
≥ 11 years	13	43.3	13	43.3	26	43.3
Treatment duration						
1—5 years	16	53.3	12	40.0	28	46.7
6—10 years	3	10.0	6	20.0	9	15.0
≥ 11 years	11	36.7	12	40.0	23	38.3
Anti-HT[b] *drug*						
Yes	27	90.0	27	90.0	56	90.0
No	3	10.0	3	10.0	6	10.0
Additional disease						
Yes	19	63.3	21	70.0	40	66.6
No	11	36.7	9	30.0	20	33.3
Disease item[c]						
Diabetes mellitus	7	23.3	9	30.0	16	26.7
Heart disease	8	26.7	7	23.3	15	25.0
Kidney disease	—		2	6.7	2	3.3
Joint disease	14	46.7	12	40.0	26	43.3
Other	5	16.7	6	20.0	11	18.3
Non-drug therapy						
Yes	9	30.0	12	40.0	21	35.0
No	21	70.0	18	60.0	39	65.0
Non-drug therapy item[d]						
Garlic chewing	5	16.7	4	13.3	9	15.0
Sour drinking	4	13.3	4	13.3	8	13.3
Music listening	—		1	1.3	1	1.7
Other	7	23.3	10	33.3	17	28.3

[a] HT, Hypertension.
[b] Anti-HT, Antihypertensive.
[c] Some patients defined to have more than one disease.
[d] Some patients defined to use more than one non-drug therapy.

showed no difference in the control group, except for day 5 and 11 (data not shown). However, when a between group comparison was performed on the results obtained on day 28, there was no statistically significant difference between the control (115.17 ± 5.28 mmHg) and the music therapy (114.67 ± 6.00 mmHg) groups (Fig. 2) (student *t* test, unpaired, $P = 0.382$). Above all, the mean reduction in systolic blood pressure was 13.00 mmHg in the music therapy group and 6.50 mmHg in the control group. The baseline adjusted between treatment group difference was not statistically significant (95% CI 6.80—9.36).

Diastolic blood pressure in day 28 (last measurement: 70 mmHg) was slightly lower than that in day 1 (first measurement: 77.50 mmHg) in the music therapy group (Fig. 3) (Wilcoxon signed-rank test, $P = 0.002$). Intriguingly, patients in the control group also showed a decrease in diastolic blood pressures after a 28-day trial (Day 1: 80 mmHg; day 28: 70 mmHg) (Fig. 3) (Wilcoxon signed-rank test, $P = 0.034$).

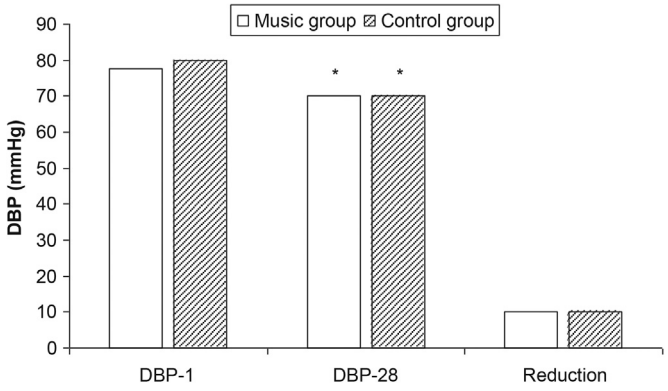

Figure 3 Comparison of diastolic blood pressures (median) measured at day 1 (DBP-1) and 28 (DBP-28) in music and control groups. The difference between DBP-1 and DBP-28 (baseline adjusted: DBP-1 minus DBP-28) is presented as reduction. Within group comparisons (DBP-1 vs DBP-28): Wilcoxon signed-rank test, *, $P < 0.05$.

While pre- and post-measurements collected every single day showed statistically significant attenuations in 12 out of 28 days in the music therapy group, there was a significant decrease in diastolic values only in day 11 in the control group (data not shown). Nevertheless, diastolic blood pressures measured on day 28 in the control group (70 mmHg) did not significantly differ from those obtained from the music therapy group (70 mmHg) (Fig. 3) (Mann—Whitney *U* test, $P = 0.471$). The median reduction in diastolic blood pressure was 10 mmHg in the music therapy group and 10 mmHg in the control group. The between treatment group difference was not statistically significant (Mann—Whitney *U* test, $P = 0.839$).

As regards to HAM-A values, 28-day music therapy did not bring about a statistically significant decrease in HAM-A values (Fig. 4) (Student *t* test, paired, $P = 0.057$). Similarly, no noteworthy change in HAM-A values was observed in the control group (Fig. 4) (Student *t* test, paired, $P = 0.440$). In addition, no difference was detected between the values obtained from the control and the music therapy groups on day 28 (Fig. 4) (Student *t* test, unpaired, $P = 0.084$). The mean reduction in HAMA-A was 1.63 in the music therapy group and 0.77 in the control group. The baseline adjusted between treatment group difference was not statistically significant (95% CI 0.82—1.92) (Student *t* test, unpaired, $P = 0.501$).

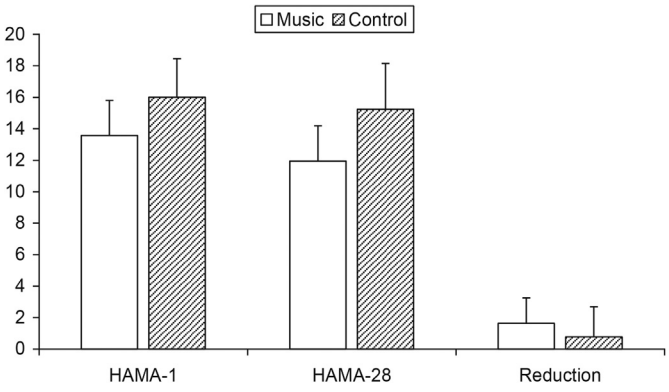

Figure 4 Comparison of Hamilton anxiety scale scores (mean ± 95% CI) measured at day 1 (HAMA-1) and 28 (HAMA-28) in music and control groups. The difference between HAMA-1 and HAMA-28 (Baseline adjusted: HAMA-1 minus HAMA-28) is presented as reduction.

The correlation analysis showed no significant relationship between systolic as well as diastolic blood pressure and HAM-A values regarding the values obtained both at the beginning and at the end of the study (day 1) in the music therapy group (Table 3). Similar results were obtained for the control group (Table 3).

Discussion

The main finding of the present study is that both Turkish classical music exposure and resting alone seem to be beneficial in lowering systolic and diastolic blood pressures in the hypertensive elderly patients. Thus, it can be stated that the beneficial effects may be due to a mixture of the music and resting.

The fact that acute music exposure reduced systolic blood pressures in 19 out of 28 days indicated a profound efficacy of single music listening. Similarly, Steelman[18] found that single music therapy applied in surgical interventions significantly decreased systolic blood pressures of the patients. Additionally, a 60-min exposure of the classical music (Bach's 19 trio sonatas) to the patients receiving mechanical ventilatory support significantly diminished mean arterial systolic blood pressure.[19] In parallel with acute exposure results, chronic exposure of Turkish classical music reduced systolic blood pressure as well. A similar result was obtained in a study wherein classical music exposure for 4 weeks was demonstrated to be effective in reducing systolic blood pressures of the hypertensive patients.[9] In another study, systolic blood pressure attenuated in response to the music exposure when hypertensive patients listened to the music as a group once a week for 60 min over a 12-week period.[10] Although the attenuation seen in systolic blood pressure in response to 28-day resting period was not statistically significant, the mean level obtained at the end of the study (<120 mmHg) makes this effect clinically important. Thus, the similarities in mean reductions in both groups supported the beneficial effect of the resting period alone. Probably, resting alone triggers a meditative, relaxing state in these patients, thereby reducing systolic blood pressure. In fact, general measures such as relief of mental tension by yoga, transcendental meditation, autogenic training and progressive relaxation have been utilized in order to mitigate negative outcomes of high blood pressure.

As to diastolic blood pressure, chronic exposures of Turkish classical music and resting alone exerted favorable effects in the hypertensive patients. Whereas a significant decrease in diastolic blood pressure in response to music exposure was observed in a previous study,[10] music did not show any effect in another study.[9] Controversial results seen among various studies may derive from distinct music types, differences in mean age, and discrepant study designs. On the other hand, single music exposure did not attenuate diastolic blood pressure in almost all cases, pointing out

Table 3 Correlation analysis between blood pressure and HAM-A values.

		Music group		Control group	
		r	*p*	*r*	*p*
Day 1	HAMA-A vs SBP	0.121	0.523	-0.020	0.917
	HAMA-A vs DBP	0.078	0.683	0.110	0.562
Day 28	HAMA-A vs SBP	−0.095	0.619	0.049	0.798
	HAMA-A vs DBP	0.251	0.181	0.158	0.403

HAMA-A, the Hamilton anxiety scale; SBP, systolic blood pressure; DBP, diastolic blood pressure. Pearson-correlation test was applied.

the cumulative effect of Turkish classical music on diastolic blood pressure.

Regarding reductions seen in systolic blood pressures (baseline adjusted values), music exposure, though not significant, seemed to more efficiently attenuate these values in comparison with the resting group. Such a decrease in systolic blood pressure (below 120 mmHg) may be clinically important as cardiovascular disease risk doubles for each increment of 20 mmHg, beginning at 115 mmHg.[1] The reductions seen in diastolic blood pressures were identical in each group and last measurements were below 75 mmHg, indicating a profound effect in favor of the prevention of cardiovascular disease. Similar to systolic blood pressure, a 10 mmHg increment of diastolic pressure dramatically increases the risk of cardiovascular disease, particularly above the level of 75 mmHg.[1] Overall, music therapy seems to be more effective in attenuating systolic blood pressure than diastolic one. It is clinically significant since systolic blood pressure is, in those older than age 50, a more important cardiovascular disease risk factor than diastolic blood pressure.[1]

Regarding the mechanisms of action, music, by masking environmental noises, directs one's attention to a more pleasant emotional state, thereby triggering feelings in connection with physical and mental relaxation.[20] Many studies have shown that music brings about the occurrence of relieving positive emotions and these are connected with the activation of the limbic system.[21,22] Furthermore, music can trigger psychophysiological response in individuals by the effect of vibrations on the limbic system, thereby releasing endorphins with the potential to induce analgesic effects and feeling of well-being.[23] Moreover, listening to music has been demonstrated to decrease cortisol levels, which may cause relaxation and mitigate anxiety levels.[24] In addition, music may bring forth pleasant memories that could stimulate positive feelings and relaxation.[25,26]

Although our results supported a favorable effect of Turkish classical music on blood pressure, various intrinsic and extrinsic factors could have interfered with these results. As mentioned above, the study was carried out in a local elderly home, which enabled us to mitigate the influences of extrinsic factors on blood pressure. The similarities seen in patients' accommodation conditions and daily activities seem to be advantageous in avoiding such extrinsic confounding factors. In addition, intrinsic factors originating from each patient were shown to be ineffective since individual characteristics of the patients were similar in the two groups (see Tables 1 and 2). Among these factors, age has prominently been indicated to have an effect on blood pressure[3,4] and, in the present study, average age was identical in each group.

As conducting the study in a local elderly home seems to be advantageous in collecting reliable data, living in such a place, conversely, may deteriorate the mental status of the patients in favor of anxiety.[13–16] Since previous studies have shown anxiety to be a negative factor against the control of blood pressure,[10,14–16] it was an obligation to assess the mental status of the patients in the present study. However, our data obtained from either the music or the control group demonstrated no statistically significant decrease in HAM-A values, discarding the possibility that music or resting alone exclusively influences anxiety state of the patients. In addition, further correlation analysis was performed to address whether music influences blood pressure through the mechanisms related to anxiety, and similarly, no correlation was found between anxiety levels and blood pressures. In contrast, 30-minute exposure to Turkish classical music on the patients undergoing colonoscopy significantly attenuated the anxiety levels as evaluated by State Trait Anxiety Inventory (STAI) in a previous study.[27] The difference between this previous study and the present study may be that colonoscopy is, apparently, a challenging procedure for patients causing extensive anxiety and this may lead music therapy to be more effective in comparison to our study. In support of this view, many investigations performed on patients subject to similar stressors such as gastroscopy,[28] mechanical ventilation,[29] and arthroscopy[30] showed beneficial effects in attenuating anxiety levels. As to our study, anxiety levels of the elders may not be sufficiently high enough to respond music therapy. In this context, low levels of HAM-A at the beginning of the study could be responsible for the ineffectiveness of music therapy on anxiety levels. If these values were much higher, music therapy would have been beneficial. According to psychological theory of stress developed by psychologist Rudolph Lazarus, anxiety is a dysphoric affective state which manifests in response to a perceived threat.[13] Apparently, the elders participated in our study showed a very little sign of perceived threat in the confines of the elderly home as their HAMA-A scores could be regarded as low. As opposed to our study, music therapy was shown to be effective on anxiety in patients with dementia in an elderly home.[31] In support of this, patients with Alzheimer's disease were found to benefit from music therapy in reducing anxiety

levels.[32] As patients with dementia are prone to perceive the surrounding environment more threatening due to their decreased ability of control and interpretation, one would expect anxiety be more intense and sensitive to music therapy.

The type of music selected might be considered as the first limitation of the study since different types of music may differentially affect blood pressure. However, the familiarity of the subjects to Turkish classical music seems to attenuate the significance of this limitation. On the other hand, it must be kept in mind that selection of music type directly by the patients would augment the effect of these potential interventions. Such an approach was not preferred in the present study to provide a standard and reliable trial. The investigator responsible for measuring blood pressure was not blind to the study, which could have influenced the outcome. However, the finding that blood pressures had decreased both by music exposure and resting diminishes the probability of bias on the measurements. Adding a third group without music exposure or resting period would have been a rational strategy to compare the efficacy of these two interventions with those obtained from a baseline group. However, the number of eligible subjects residing in the elderly home was an obstacle to form a third group. Finally, we did not record the weights of the participants as a weight loss could have affected blood pressures during the trial. Nonetheless, such a dramatic weight loss would not be expectable considering the sedentary life styles of the subjects and duration of the study.

As to relevance to clinical practice, nurses responsible for the care of geriatric people may add music therapy to hypertension treatment protocol under the supervision of a physician in order to minimize adverse effects and drug interaction deriving from multi-drug prescription. Considering the reductions observed both in systolic and diastolic blood pressures, such an adjunctive therapy may lead to measurable health benefits in terms of reduced morbidity and/or mortality. Further studies with greater sample size and sophisticated study designs are required to exactly confirm the effectiveness of Turkish classical music on hypertension.

In conclusion, Turkish classical music and resting alone were proved to have favorable effects on blood pressure in elderly hypertensive patients. However, the present study did not achieve to demonstrate a specific effect of Turkish classical music. Nevertheless, listening to music increases the pleasure of resting, thereby enabling the patients to benefit from this particular intervention. Low expenditure, lack of side effects and practical usage of music therapy makes it a reasonable alternative especially in clinical nursing settings.

Conflict of Interest statement

We, the authors of the present study, declare that there is no conflict of interest regarding the paper entitled ''Effect of Turkish Classical Music on Anxiety State and Blood Pressure in Hypertensive Elderly Patients''.

Acknowledgment

The present study is a master thesis completed in Department of Internal Medicine Nursing, Faculty of Health Sciences, Gaziantep University, Gaziantep, Turkey.

References

1. The Seventh Report of the Joint National Committee on Prevention, Detection Evaluation, and Treatment of High Blood Pressure. The JNC 7 Report. JAMA 2003; 289: 2560—72.
2. Wolf-Maier K, Cooper RS, Banegas JR, Giampaoli S, Hense HW, Joffres M, et al. Hypertension prevalence and blood pressure levels in 6 European countries Canada, and the United States. *JAMA* 2003;**289**:2363—9.
3. Altun B, Arıcı M, Nergizoğlu G, Derici Ü, Karatan O, Turgan Ç, et al. For the Turkish society of hypertension and renal diseases prevalence, awareness, treatment and control of hypertension in Turkey (the Patent study) in 2003. *Journal of Hypertension* 2005;**23**:1817—23.
4. Arici M, Turgan C, Altun B, Sindel S, Erbay B, Derici U, et al. Turkish society of hypertension and renal diseases hypertension incidence in Turkey (HinT): a population-based study. *Journal of Hypertension* 2010;**28**:240—4.
5. McCaffrey R. Music listening: its effects in creating a healing environment. *Journal of Psychosocial Nursing and Mental Health Services* 2008;**46**:39—44.
6. Wakim JH, Smith S, Guinn C. The efficacy of music therapy. *Journal of Perianesthesia Nursing* 2010;**25**:226—32.
7. Biley FC. The effects on patient well-being of music listening as a nursing intervention: a review of the literature. *Journal of Clinical Nursing* 2000;**9**:668—77.
8. Evans D. The effectiveness of music as an intervention for hospital patients: a systematic review. *Journal of Advanced Nursing* 2002;**37**:8—18.
9. Teng XF, Wong MY, Zhang YT. The effect of music on hypertensive patients. *Conference of the IEEE Engineering in Medicine and Biology Society* 2007;**2007**:4649—51.
10. Zanini CR, Jardim PC, Salgado CM, Nunes MC, Urzêda FL, Carvalho MV, et al. Music therapy effects on the quality of life and the blood pressure of hypertensive patients. *Arquivos Brasileiros de Cardiologia* 2009;**93**:534—40.
11. Yu JY, Huang DF, Li Y, Zhang YT. Implementation of MP3 player for music therapy on hypertension. *Conference of the IEEE Engineering in Medicine and Biology Society* 2009;**2009**:6444—7.
12. Snowdon J. Mental health in nursing homes. *Perspectives on the Use of Medication Drugs Aging* 1993;**3**:122—30.
13. Zuidema S, Koopmans R, Verhey F. Prevalence and predictors of neuropsychiatric symptoms in cognitively impaired nursing home patients. *Journal of Geriatric Psychiatry and Neurology* 2007;**20**:41—9.
14. Coelho R, Hughes AM, da Fonseca AF, Bond MR. Essential hypertension: the relationship of psychological factors to the severity of hypertension. *Journal of Psychosomatic Research* 1989;**33**:187—96.
15. Nasilowska-Barud A, Kowalik M. Characteristics of depressive changes and anxiety in patients with essential hypertension. *Annales Universitatis Mariae Curie-Sklodowska* 2004;**59**:428—33.
16. Saboya PM, Zimmermann PR, Bodanese LC. Association between anxiety or depressive symptoms and arterial hypertension, and their impact on the quality of life. *International Journal of Psychiatry in Medicine* 2010;**40**:307—20.
17. Yazıcı MK, Demir B, Tanrıverdi N, Karaağaoğlu E, Yolaç P. Hamilton Anksiyete Değerlendirme Ölçeği Değerlendiriciler Arası

Güvenilirlik ve Geçerlilik Çalışması. *Türk Psikiyatri Dergisi* 1998;**9**:114—7.
18. Steelman VM, Intraoperative music therapy. Effects on anxiety, blood pressure. *AORN Journal* 1990;**52**:1026—34.
19. Korhan EA, Khorshid L, Uyar M. The effect of music therapy on physiological signs of anxiety in patients receiving mechanical ventilatory support. *Journal of Clinical Nursing* 2011;**20**:1026—34.
20. Koch ME, Kain ZN, Ayoub C, Rosenbaum SH. The sedative and analgesic sparing effect of music. *Anesthesiology* 1998;**89**:300—6.
21. Blood AJ, Zatorre RJ. Intensely pleasurable responses to music correlate with activity in brain regions implicated in reward and emotion. *Proceedings of the National Academy of Sciences of the United States of America* 2001;**98**:11818—23.
22. Menon V, Levitin DJ. The rewards of music listening: response and physiological connectivity of the mesolimbic system. *Neuroimage* 2005;**28**:175—84.
23. White JM. Music therapy: an intervention to reduce anxiety in the myocardial infarction patient. *Clinical Nurse Specialist* 1992;**6**:58—63.
24. Khalfa S, Bella SD, Roy M, Peretz I, Lupien SJ. Effects of relaxing music on salivary cortisol level after psychological stress. *Annals of the New York Academy of Sciences* 2003;**999**:374—6.
25. Son GR, Therrien B, Whall A. Implicit memory and familiarity among elders with dementia. *Journal of Nursing Scholarship* 2002;**34**:263—7.
26. Cuddy LL, Duffin J. Music, memory, and Alzheimer's disease: is music recognition spared in dementia, and how can it be assessed? *Medical Hypotheses* 2005;**64**:229—35.
27. Ovayolu N, Ucan O, Pehlivan S, Pehlivan Y, Buyukhatipoglu H, Savas MC, et al. Listening to Turkish classical music decreases patients' anxiety, pain, dissatisfaction and the dose of sedative and analgesic drugs during colonoscopy: A prospective randomized controlled trial. *World Journal of Gastroenterology* 2006;**12**:7532—6.
28. Hoya Y, Matsumura I, Fujita T, Yanaga K. The use of nonpharmacological interventions to reduce anxiety in patients undergoing gastroscopy in a setting with an optimal soothing environment. *Gastroenterology Nursing* 2008;**31**:395—9.
29. Han L, Li JP, Sit JW, Chung L, Jiao ZY, Ma WG. Effects of music intervention on physiological stress response and anxiety level of mechanically ventilated patients in China: a randomised controlled trial. *Journal of Clinical Nursing* 2010;**19**:978—87.
30. Kaempf G, Amodei ME. The effect of music on anxiety: a research study. *AORN Journal* 1989;**50**:112—8.
31. Sung HC, Chang AM, Lee WL. A preferred music listening intervention to reduce anxiety in older adults with dementia in nursing homes. *Journal of Clinical Nursing* 2010;**19**:1056—64.
32. Guétin S, Portet F, Picot MC, Pommié C, Messaoudi M, Djabelkir L, et al. Effect of music therapy on anxiety and depression in patients with Alzheimer's type dementia: randomised, controlled study. *Dementia and Geriatric Cognitive Disorders* 2009;**28**:36—46.