

Evaluating effects of different musical types on depression, sleep quality, mental state and anxiety in stroke patients

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Abstract

Aim: Music's rehabilitative effects are clear in the literature, but the effect of the music type on the post-stroke patients is not clear. The aim of the present study was to investigate the effects of listening different types of music on depression, sleep quality, mental state and anxiety in post-stroke patients.

Material and Methods: The study was conducted prospectively. Thirty post-stroke patients admitted to Department of Neurology, Faculty of Medicine at Mustafa Kemal University, were considered for the study. The patients' depression level, sleep quality, anxiety and cognitive status were evaluated. Subjects were listening music during the rehabilitation program. Subjects were separated as the Eastern Music group (n=10), western music group (n=10) and control group (n=10). Beck Depression Inventory (BDI), Beck Anxiety Inventory (BAI), Standardized Mini Mental Test (SMMS), and Pittsburgh Sleep Quality Index (PSQI) tests were performed for all subjects twice pre and post-treatment.

Results: There was a significant difference in SMMS and BDI within the eastern and Western Music groups ($p < 0.05$). PSQI score decreased an average of 1.4 points within only the Western Music group and it was statistically significant. There was no significance in any of the parameters of the control group. There was no statistical difference between the three groups.

Conclusion: Although positive results within groups were found, there was no significant difference among the groups; therefore, music listening independent of the music type has no effect on sleep quality, mood, mental state and anxiety.

Keywords: Depression; Sleep Quality; Mental State; Anxiety, Stroke.

INTRODUCTION

Every culture in the world has developed some form of musical expression. Some music is fast, some are slow. Music type may affect the impact it leaves on the people. Master in Anatolia Mevlana Celaleddin Rumi believed that "Music is the language of God, love of the lovers." Music influences a variety of domains such patient mood, pain perception, language capacity and sleep function and the general sense of well-being; ergo it affects the lives of the people listening to them. "In our roles as healers, it is our duty to utilize all available means to treat our patients as effectively as we can. If an intervention as simple as providing them with music speeds their recovery or minimizes their discomfort in any way and even if it only produces a placebo effect, then why would we not participate in this endeavor?" (1,2).

Different mood disorders such as depression, anxiety and sleep disorders occur frequently post stroke. Over the past 10 years, there has been a growing interest in psychiatric sequelae of stroke. Clinically, anxiety and depression can be potentially serious and disabling with manifold adverse consequences on a patient's daily functioning, interpersonal relationships, and quality of life (3,4). Mood disorder is associated with reduced social functioning and increased mortality. Music is a multimodal stimulus which activates many brain structures related to sensory processing, attention and memory, and can stimulate cognition and multisensory integration. Music therapy has been used in a range of ways to treat depression in many other diseases (5-8). Music therapy is an established healthcare profession which uses music to address physical, emotional, cognitive and social needs of individuals of all ages (6).

Received: 15.12.2017 **Accepted:** 10.01.2018

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There are many studies about music listening, however we used two different types of music, one of which was Western and the other Eastern Music. The Western Music was fast and foreign for Turkish patients and the Eastern Music was slow and familiar. Instrumental music is slow and allows the mood to relax, but the Western Music is fast and makes the listeners happier. In the literature, it is clear that music is rehabilitative, but the effect of the music type on the post-stroke patients is not clear.

The aim of the present study was to investigate the effects of different types of music listening on depressive mood, sleep quality, mental state and anxiety in stroke patients.

Research Questions

- Does music have an effect on sleep quality, depression, mental state and anxiety in stroke patients?
- Do fast and slow music have discrete effects on sleep quality, depression, mental state and anxiety in stroke patients?

MATERIAL and METHODS

All patients diagnosed by a neurologist as having had stroke were invited to participate in the study. Thirty-one patients admitted to the Neurology Department of Medicine, Mustafa Kemal University Hospital (Turkey) and who accepted to participate were included to the study. Ethical approval was obtained from the human research ethics committee of the Mustafa Kemal University. The study was conducted in accordance with the principles of the Declaration of Helsinki. Informed consent was obtained from all patients. The research period was from January 2015 to August 2016.

The inclusion criteria for the study were:

- Patients for whom the duration of the disease is between 0-24 months.

The exclusion criteria for the study were:

- Patients with recurrent strokes.
- Patients with communication problems.
- Patients with hearing loss.
- Having another disease causing movement problems.
- If they had any other physical problem or epilepsy.

Design

Thirty-one subjects were registered to the study. Subjects were separated as the Eastern Music group (n=10), the Western Music group (n=10) and control group (n=11). In the midst of the training, one subject of the control group left the group due to being transferred to another hospital. Patients who were included in the Western and the Eastern Music groups listened to music during the rehabilitation program, but the control group rehabilitated without music. The patients listened to the music and they were asked which group they wanted to be in. No music choice was presented as well. According to the patients' preferences, the groups were created. Thus, 30 subjects completed the training planned for this research. The flow chart of data collection and evaluation procedure were shown in Figure 1.

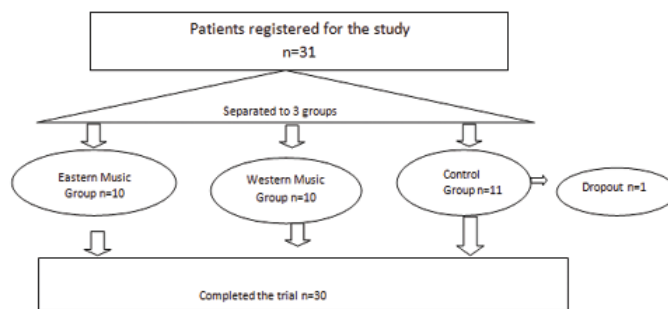


Figure 1. The flow chart of the data collection and evaluation procedure

Interventions

Patients' depression level was examined with Beck Depression Inventory (BDI), sleep quality with Pittsburgh Sleep Quality Index (PSQI), anxiety with Beck Anxiety Inventory (BAI) and cognitive status with Standardized Mini-Mental Test (SMMS). All tests were performed for all of the subjects twice prior to and after the treatment.

Neurodevelopmental Treatment method was used for the rehabilitation. The treatment program was developed taking the functional limitations of the patients into account and consisted of upper and lower extremity exercises according to the Bobath concept. Subjects in the music groups additionally listened to music during the entire rehabilitation program. The duration of the rehabilitation program was 2 weeks, 10 sessions, and every session lasted 1 hour. The patients listened to music while they were exercising. The Eastern Music was slow and the Western Music was fast; we wanted the patients to listen to them and exercise, but we did not interfere with the speed of their movements.

The rehabilitation program was accompanied by the following music. During the sessions, the songs continued to play via amplifiers.

Songs of the Eastern Music group

1. The Man in the Mosque - Yınon Muallem – Instrumental
2. Hüzam Saz Semaisi – Yınon Muallem – Instrumental
3. Changing Moments – Yınon Muallem – Instrumental

Songs of the Western Music group

1. Dañs-Tro Fisel - The Chieftains
2. The Landlord's Walk – Blair Douglas
3. Tziganski Tantz – İbro Lolov
4. Vecheren Tantz (An Evening Dance) – İbro Lolov

Statistical Analysis

The statistical analyses were carried out with Statistical Package for the Social Sciences 22. All data for normality was tested using the Shapiro Wilk test. The descriptive statistics were given as the mean±standard deviation for the continuous variables' results. Data analysis group differences in depressive mood, sleep quality, mental state and anxiety between groups were tested by the Kruskal-Wallis Test. In addition, the differences in depressive mood, sleep quality, mental state and anxiety within groups were analyzed with the Wilcoxon Signed-Rank Test. The level of statistical significance was set at $p < 0.05$.

RESULTS

The average age of the Eastern Music group was 64.60±6.80 years, the Western Music group was 58±9.78 years and the control group was 61±10.45 years. Both in the Eastern and Western Music groups there were 3 females and 7 males and in control group 2 females and 8 males. Duration of the disease in the Eastern Music group was 2.10±0.99 months, in the Western Music group 1.90±1.1 months and in the control group 2.4±1.07 months.

There was a significant difference in SMMT and depression levels between the pre and post-treatment results in the Eastern and Western Music groups. The BDI score after music listening decreased by an average of 3 points in the Eastern Music group and 4.3 in the Western Music group (p<0.05). PSQI score decreased an average of 1.4 points only within the Western Music group and it was statistically significant. There was no significance in any of the parameters of the control group (Table 1).

There was no statistical difference between the three groups neither pre nor post-treatment results (Table 2).

Table 1. Comparison of mental state, depression, anxiety, and sleep quality within the three groups

	Pre-treatment		Post-treatment	
	X±SD	X±SD	z	p
Eastern Music Group				
SMMT	22.70±3.36	23.80±3.76	-1.980	0.048*
BDI	18.50±7.48	15.30±6.46	-2.384	0.017*
BAI	8.10±5.72	6.60±4.85	-1.897	0.058
PSQI	5.60±5.18	4.60±2.66	-1.289	0.197
Western Music Group				
SMMT	23.40±4.19	25±3.29	-2.124	0.034*
BDI	20.90±9.74	16.60±9.51	-2.439	0.015*
BAI	8.40±3.62	6.90±2.92	-1.897	0.058
PSQI	6.80±2.52	5.40±2.95	-1.980	0.048*
Control Group				
SMMT	23.60±4.74	24.40±4.29	-1.279	0.201
BDI	19.10±9.09	15.90±7.85	-1.474	0.141
BAI	7± 4.57	5.70±4.85	-1.614	0.106
PSQI	4.20±1.75	3.5±1.5	-1.890	0.059

Wilcoxon Singed Rank Test *p<0.05

BDI: Beck Depression Inventory, BAI:Beck Anxiety Inventory, SMMT: Standardized Mini Mental Test, PSQI: Pittsburgh Sleep Quality Index

Table 2. Comparison of mental state, depression, anxiety and sleep quality among the Eastern Music Group, Western Music Group and control group

	Pre-treatment		Post-treatment	
	Chi-square	P	Chi-square	p
SMMT	0.658	0.720	0.364	0.834
BDI	0.397	0.820	0.109	0.947
BAI	0.635	0.728	0.792	0.673
PSQI	5.475	0.065	2.377	0.305
PSQI	5.475	0.065	2.377	0.305

Kruskal-Wallis Test

BDI: Beck Depression Inventory, BAI:Beck Anxiety Inventory, SMMT: Standardized Mini Mental Test , PSQI: Pittsburgh Sleep Quality Index

DISCUSSION

This study investigated the effects of music-listening and different types of music on depressive mood, sleep quality, mental state and anxiety in stroke patients. The subjects were assigned to the Eastern Music and Western Music groups and also a control group; the difference between pre-treatment and post-treatment was compared within and among these 3 groups. There was a significant difference in SMMT and BDI within the Eastern and Western Music groups. PSQI score decreased significantly after the treatment only in the Western Music group. There was no significance in the control group's post-treatment scores compared to pre-treatment. Statistically significant improvements were not documented in all tests for inter-group evaluation. Music type had no effect on recovery.

Music therapy is the clinical and evidence-based use of music interventions to accomplish individualized goals within a therapeutic relationship (8). Music motivates people to adhere to exercise regimens, distracts attention from physical effort and reduces perceived exertion (9,10). Also, one major advantage of music therapy is that it has a low possibility of creating side effects because it is non-invasive and does not involve use of drugs (11). In literature, many studies declared positive effects of music; we found positive results in depression, sleep quality and mental state within the music groups. However in our study there was no superiority of music over the control group and the music type did not affect this result either.

Music is an enjoyable leisure activity which also engages many emotional, cognitive, and motor processes in the brain. Music-listening, alone, has been shown to improve cognition and mood among stroke survivors. Several studies have shown positive effects of music listening on mood and on cognitive and motor processing post-stroke. (12-15). Also, Forsblom et al. applied preferred music listening in stroke rehabilitation and Chen et al. used self-selected individual listening in two different conditions: Pleasant music and unpleasant music in stroke rehabilitation. The results showed a positive effect of music listening on mood under pleasant music in patients with stroke in both of the studies (14-17).

Sarkamo et al. indicated that listening to pleasant music can have a short-term facilitating effect on visual awareness in patients with visual neglect, which is associated with functional coupling between emotional and attentional brain regions. Secondly, daily music listening can improve auditory and verbal memory, focused attention and mood as well as induce structural gray matter changes in the early post stroke stage (13-15).

Contrary to that study, we found there was no significant difference between slow and fast music. The patients are disabled and exercising requires attention and focusing. Therefore, we think that the patients only in the beginning paid attention to the music and later they did not; they focused on their exercises. We think that this could be the reason for the no difference.

Almedia et al. conducted a study, in which the subjects were divided into three groups: No musical stimulation group (control) and, 90 and 140 beats per minute musical tempo groups. Fast music (140 beats per minute) promotes a higher rating of perceived exertion and greater performance in self-selected walking pace without significantly altering physiological variables or affective response (18).

A frequently visited topic in cognitive physiology is music's influence on simple tasks. Bade et al.'s study addressed the effect of differing music tempos on a subject's typing performance. When compared to no music, slow tempo music did not significantly affect typing performance ($p=0.479$), heart rate ($p=0.249$), blood pressure ($p=0.221$), or brain activity. Similarly, fast tempo music did not change typing performance ($p=0.364$), heart rate ($p=0.0689$), blood pressure ($p=0.519$), or brain activity (19). Our results are in agreement with the findings of this study. We did not find superiority of either kinds of music over the control group. We examined mostly not the physiological results, but the psychological effects. Psychological outcome requires more effective and lasting therapy. Short therapies cannot provide effects that we expect, but physiological alteration can be obtained easier and it can be measured easier and faster. If we had evaluated the physiological effects, we might have found different results related to music type. Future studies may include both the physiological and the psychological evaluations.

Harmat et al. stated that relaxing classical music is an effective intervention in reducing sleeping problems in healthy students. There are many studies which have shown that music has positive effects on many disorders (19-21). But only a few studies examined music's effect in many parameters on stroke patients. In our study, we examined music's effect on sleep quality in stroke patients; additionally, we analyzed different types' effects as well. We found that Western Music has positive effects on sleep quality while Eastern Music does not in the intergroup differences. Western Music is an enjoyable music and patients were motivated and happy while listening to it. Eastern Music is slower, more emotional and the patients' exercise speed was the same before listening to it. The reason for the decrease of the PSQI score in the Western Music group is that this kind of music is fast and enjoyable. This music recalled lovely memories such as weddings, parties etc. Also patients did their exercises faster and this caused fatigue; we think that fatigue provided better sleep quality.

Venter conducted a study to investigate the influence of the tempo of music on concentration and driving ability. Concentration was measured by driving errors, whereas the driving ability was measured by lap-times and elicited behavior. Four treatment conditions were utilized; that is a no-music control condition, low tempo music, medium tempo music and high tempo music treatment conditions. Results showed that the tempo of music does not have any influence on concentration; however, significant

results were obtained indicating that the tempo of music does have an influence on driving behavior (22). In our study, we examined the effect of music tempo and we found no difference in the intra-group statistics. The evaluated parameters are not physiological and the tempo did not affect mood and sleep quality. If we had evaluated the physiological parameters such heartbeat, walking speed and tension, we think that we would have found a difference between the groups.

There were some limitations in this study. At first, the number of patients included in the study was small and we did not match the lesion site and the severity of patients' disease and function. This study is innovative in using and comparing different types of music. There are many studies which examined the effect of music in stroke, but only a few studies examined slow and fast music's effects.

We found difference within groups, but not between groups. We think that the small study group and the short rehabilitation duration caused this result; future studies should include bigger study groups and the rehabilitation duration should be longer. Although positive results within the groups were found, there was no significant difference among the groups.

CONCLUSION

This study illustrated that music listening has no effect on sleep quality, mood, mental state and anxiety, but confirmation with further randomized controlled trials is required.

Financial support, Tubitak (The Scientific And Technological Research Council of Turkey)

REFERENCES

1. http://akademik.semazen.net/author_article_print.php?id=1196dementia in the elderly. N Eng J Med 2003;348:2508-16. accessed date 15.09.2017
2. Kobets AJ. Harmonic medicine: the influence of music over mind and medical practice. Yale J Biol Med 2011;84(2):161-7.
3. Wallace DM, Ramos AR, Rundek T. Sleep disorders and stroke. Int J Stroke. 2012;7(3):231-42.
4. Regier DA, Narrow WE, Rae DS. The epidemiology of anxiety disorders: the Epidemiologic Catchment Area (ECA) experience. J Psychiatr Res 1990;24:3-14.
5. Maratos AS, Gold C, Wang X, Crawford MJ. Music therapy for depression. Cochrane Database Syst Rev 2008;23(1):CD004517.
6. American musical therapy association website, www.musictherapy.org accessed date 23.05.2017
7. Raghavan P, Geller D, Guerrero N, Aluru V, Eimicke JP, Teresi JA, et al. Music upper limb therapy-integrated: an enriched collaborative approach for stroke rehabilitation. Front Hum Neurosci 2016;7(10):498.
8. Bunketorp Kall L, Lundgren-Nilsson Å, Blomstrand C, Pekna M, Pekny M, Nilsson M. The effects of a rhythm and music-based therapy program and therapeutic riding in late recovery phase following stroke: a study protocol for a three-armed randomized controlled trial. BMC Neurol 2012;21(12):141.
9. Wininger SR, Pargman, D. Assessment of factors associated with exercise enjoyment. J Music Ther 2003;40(1):57-73.

10. Dyrlund AK, Winger SR. The effects of music preference and exercise intensity on psychological variables. *J Music Ther* 2008;45(2):114-34.
11. Kim DS, Park YG, Choi JH, Im SH, Jung KJ, Cha YA, et al. Effects of music therapy on mood in stroke patients. *Yonsei Med J* 2011;52(6):977-81.
12. Hsu WC, Lai HL. Effects of music on major depression in psychiatric inpatients. *Arch Psychiatr Nurs* 2004;18(5):193-9.
13. Lai YM. Effects of music listening on depressed women in Taiwan. *Issues Ment Health Nurs* 1999;20(3):229-46.
14. Särkämö T, Tervaniemi M, Laitinen S, Forsblom A, Soinila S, Mikkonen M, et al. Music listening enhances cognitive recovery and mood after middle cerebral artery stroke. *Brain* 2008;131(Pt 3):866-76.
15. Särkämö T, Soto D. Music listening after stroke. beneficial effects and potential neural mechanisms. *Ann. N Y Acad. Sci* 2012;1252:266-81.
16. Forsblom A, Särkämö T, Laitinen S, Tervaniemi M. The effect of music and audiobook listening on people recovering from stroke: The patient's point of view. *MMD* 2010;2:229-33.
17. Chen MC, Tsai PL, Huang YT, Lin KC. Pleasant music improves visual attention in patients with unilateral neglect after stroke. *Brain Inj* 2013;27(1):75-82.
18. Almeida FAM, Nunes RFH, Ferreira SS, Krinski K, Elsangedy HM, Buzzachera CF, et al. Effects of musical tempo on physiological, affective, and perceptual variables and performance of self-selected walking pace. *J Phys Ther Sci* 2015;27(6):1709-12.
19. Bade D, Bade R, Hoerres D, Kremsreiter A. The Effects of Music Tempo on Concentration and Task Performance <http://jass.neuro.wisc.edu/2012/01/Lab%20603%20Group%207%20Submission%20FINAL.pdf>
20. Harmat L, Takács J, Bódizs R. Music improves sleep quality in students. *J Adv Nurs* 2008;62(3):327-35.
21. Lai HL, Good M. Music improves sleep quality in older adults. *J Adv Nurs*. 2006;53(1):134-44.
22. Wang CF, Sun YL, Zang HX. Music therapy improves sleep quality in acute and chronic sleep disorders: a meta-analysis of 10 randomized studies. *Int J Nurs Stud* 2014;51(1):51-62.
23. Venter H. The effect of the tempo of music on concentration in a simulated driving experience. Master dissertation, University of South Africa, Pretoria, 2011.