

■ Original article

Studying music effect on children's stress following chemotherapy: a randomized clinical trial

Maryam Nikkhah¹, Ali Asghar Abbasi Esfajir², Mohammad Ali Heidari Gorji^{3,*}, Naiereh Aghaei⁴

(Received: 25 July 2014; Accepted 14 sep 2014)

Abstract

Background and Purpose: Due to adverse effects of cancer on children's mental health, relaxation, chemotherapy side-effects and positive effects of music therapy on stress, this study was performed with the goal to determine the effect of music therapy on children's stress after chemotherapy.

Methods: The present study is a randomized clinical trial done on 32 children undergoing cancer chemotherapy in Bu-Ali Sina hospital in Sari in the 2012-2013. By convenience sampling method and then allocation, they were randomly divided into two groups (16 people) as control and experimental. The data included the demographic questionnaires and self-assessment questionnaire stress of Sharrer -Wenger. In the intervention group, after recounting how to perform music for the child and the mother and select the songs chosen by the child for 20 minutes, half an hour before and after starting and completing chemotherapy, based on child's bearing, the was music of relaxing sounds of nature and the music for children was played. In the test group, the stress questionnaire was executed before and after music therapy before chemotherapy and after the treatment course. In the control group, before starting chemotherapy and after a course of chemotherapy treatment, the questionnaire was completed. The data was analyzed using statistical software SPSS 18 and the t-test and ANOVA with repeated measures and Pearson correlation.

Results: No Significant difference was found between the control and experimental stress scores in the two groups (after a music therapy session) before chemotherapy ($p=0/240$), but after chemotherapy, the average stress score in the experimental group, after the music therapy was significantly lower, and the difference was statistically significant ($p=0/000$).

Conclusion: Due to a substantial reduction in stress scores of music therapy in children undergoing chemotherapy, the music therapy can be an effective intervention for reducing stress and helping the children to better cope with life after being afflicted by cancer.

Keywords: Stress, Children, Chemotherapy, Music therapy

Introduction

The most common malignant cancer in pediatrics is locum which includes two thirds of children's cancers (1). Cancer is a disease that disturbs the children's and their families' mental comfort. Based on its symptoms and treatment, cancer causes anxiety and depression and their families and it is worse in children due to their age. Since stress and also the mental experiences of the patients may have negative effects on their treatment. Using non-medicinal methods is

increasing to reduce and kill pain and anxiety out of which music therapy is an effective method (2).

In nursing action, music therapy as an effective medium can be a part of the patients' care program and also can be used as a treatment method to lower pain and anxiety, to increase relaxation, body immunity and to decrease blood pressure, pulse and breath. Listening to music results in secreting endorphins and making the patient calm and relaxed (3).

The results of the study done by O'Callaghan et al.

¹ Department of Islamic Azad University.Babol, Iran.

² Department of Islamic Azad University.Amol, Iran.

^{3,*} corresponding Author: Department of Medical Surgical Nursing, Nasibeh Nursing & Midwifery School, Mazandaran University of Medical Sciences, Sari, Iran. Email: heydarigorji@yahoo.com

⁴ Department of Medical Surgical Nursing, Nasibeh Nursing & Midwifery School, Mazandaran University of Medical Sciences, Sari, Iran.

(2013) about musical therapy for children with cancer in Peter McCollum Cancer Center in Melbourne, Australia showed that music causes relaxation, relief from anxiety, promotes supporting relationships, active self-care increasing hope in these children (4).

Ghaderi et al. did a review study on the effects of music on pain and anxiety and mental effects of music. All results emphasized the effective music impacts on reducing pain and anxiety (5). Since there is no indexed study in our country about the effects of music therapy on the cancerous children and also no indexed study in other countries about the effects of music on stress following chemical therapy, the present researcher decided to do a research about determining music effects on child's stress after chemical therapy in Bu-Ali Sina hospital in Sari. It is hoped that effective measures be taken to cure the side effects after chemical therapy thanks to this study.

Materials and Methods

This is a random clinical trial single-blind study performed among the children suffering from cancer that referred to Bu-Ali hospital in Sari for chemical therapy from March 2013 to June 2013 and had a file there.

The criteria to be included in the research were one parent accompanying during chemotherapy in oncology ward, the patients & their family being willing to enter, being in the children age range, having no other illness except cancer, having no hearing problem, the children having no present surgery, lack of fever or pain while registering and filling out the vital symptoms forms, lack of mental disorder, not taking relaxing drugs based on the doctors' prescription and having stress score of over 10 in Sharrer -Wenger questionnaires.

If the patients and their families wanted to leave the study, if the children got hearing problems by the treatment side-effects, if the patients' treatment case changed from the kinds of chemotherapy medicine in

the two stages, the children would be sent to another hospital to undergo treatment.

The data collection tool were two questionnaires of demographic information and children stress symptom scale of Sharrer -Wenger (6) and two methods as library and field were used to collect data.

The demographic questionnaire included the patient's medical information, age, sex, the education level, weight, height, surgery background, diabetes background, blood pressure and hypertension background, the previous illnesses duration, the living place, and the present drugs daily dose. Also, the patients' heartbeat number, systolic and diastolic blood pressure (by German Hinnny blood pressure scale) and respiration number were measured before and after chemotherapy by the researcher.

Children stress symptom scale of Sharrer-Wenger is a 24-item self-report questionnaire with 11 items about the excitement symptoms and 13 items about the physical symptoms of stress, each question has two choices "there is (1 score) and there is not (0 score)" (6).

Two other items as vomit and sadness were added to the questionnaire later after studying the other items.

The scores of stress symptoms ranged from 0 to 26 and stress symptoms were reported in 3 levels of low, medium and high (Sharrer- Wenger, 2002). The validity of this questionnaire's translation was determined and confirmed by an English language translator and its content reliability was confirmed and determined by 10 professors of nursing and midwifery faculty and the lecturers of psychiatry department of Tabriz university and its reliability was determined by re-test method with correlation coefficient 76% (7).

To collect the data, the researcher went to Bu-Ali hospital in Sari Oncology ward with the permit from Ayatollah Amoli University to study the samples.

32 children qualified to enter the study participated in the study with non-probability sampling method and based on the goals regardless of their gender. After explaining the project to the parents and getting their written permission, the first patient was chosen

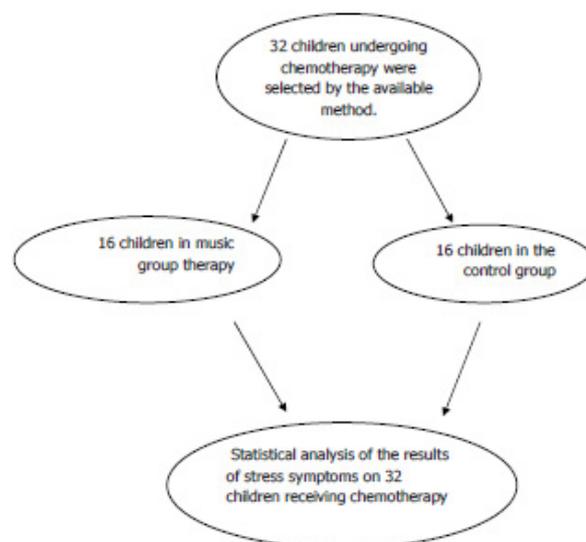
by tossing a coin, then the other ones were placed in two groups as the music therapy group (N=16) and the control group (N=16).

The relaxing & appropriate music (relaxing music based on the sound of nature and music for children) and regarding the soothing music in the papers having the beat of 60 to 80 rounds per minute were selected by Sari-based Culture Center affiliated music instructor and played by rhythm meter and turner 30 made in China.

Before chemotherapy, the patients' demographic information was given by their families or taken from their files and then stress questionnaire was filled. The style on how to play the music was explained to the children and their mothers, then the music was played for children in the experiment group for 1 to 2 minutes and after that the children were asked to choose their favorite music and listen to it for 20 minutes, 30 minutes before and after chemotherapy regarding their tolerance and patience. The stress questionnaire was filled for children in the experiment group after music therapy and before chemotherapy. The questionnaire was also filled and registered for children in the control group before chemotherapy and in the treatment period, the above mentioned process was repeated for three times for three chemotherapy stages and again and again music therapy was conducted and the questionnaires were filled and registered. For the control group, the stress questionnaire was filled but registered and evaluated without music.

These actions were performed between 9 A.M and 4 P.M because it was after the doctors' visit and office hours, so quiet and peaceful, and with no disturbance. It is worth mentioning that the single-blind study was done by the researcher dealing with filling in the questionnaires and music therapy was done along with the children's parents.

The data were analyzed by the descriptive -analytical statistics and pair T test or dependent and independent T tests and SPSS 18 software.



Flow chart describing the study participants

Results

The results suggest that the samples in both groups were the same in terms of the type of disease, gender and the other demographic information of 32 patients in our study, 56.25% were girls (75% in experimental and 37.5% in control group) and 43% were boys (25% in experimental group and 62.5% in control group). The children age ranged from 5 to 15 years old. 34% of the patients were over 9 years old and most of them had severe lymphoid leukemia. According to Pearson correlation test, there was no significant relationship between age and stress score ($p>0.05$). The independent T statistical test showed that there was no significant statistical relationship between stress and gender scores ($p>0.05$).

The results revealed that the mean score of stress in pre-test(before music therapy) and post-test(after music therapy) before chemotherapy in the intervention group were, respectively 12.81 ± 2.68 and 13.93 ± 2.51 and in the control group, 13.81 ± 1.97 and 12.87 ± 2.6 and the mean pre-test and post-test stress score after 3 sessions chemotherapy in the experimental group was as 7.37 ± 2.44 and 18.62 ± 2.44 and in the control group, it was 14.37 ± 1.8 and 13.43 ± 2.30 , respectively.

The statistical test of independent T displayed no meaningful relationship between the two groups of experimental and control after one session music

therapy ($P=0.240$). In the intra-group comparison in the experimental group before chemotherapy, the statistical test of pair T showed no meaningful decrease in the stress score after one session music therapy ($P=0.373$) (Table1).

Table1: the comparison of average stress score before chemotherapy separately in both the study and control groups

Stress score Before of chemotherapy	Group						Independent T-TEST
	Music therapy		control		Total		
	Frequency	Mean±SD	Frequency	Mean±SD	Frequency	Mean±SD	
Pre-test	16	13.93±2.51	16	12.87±2.06	32	13.40±2.32	t=1.307 df=30 p=0.201
Post-test	16	12.81±2.68	16	13.81±1.97	32	13.31±2.37	t=1.19 df=30 p=0.240
pair t-test		df=15 T=0/919 P=0/373		df=15 t=1.074 p= 0.003			

The results suggest that in the experimental group, the average stress score before chemotherapy and after music therapy was higher than that of the control group and it was a meaningful difference ($P=0.0001$). The stress score of the experimental group after chemotherapy and music therapy decreased highly and the independent T test showed a meaningful statistical difference ($P=0.0001$). In an intra-group comparison in the experimental group, the statistical pair statistical T-test revealed a meaningful decrease in the stress score after the whole period of chemotherapy ($P=0.0001$) but there was no significant difference in the control group's stress score ($P=0.127$) (Table 2). The patients with the stress score over 10 were 87.5% after one session music therapy and after the music therapy and chemotherapy; they were 18.75% (with the stress score 10).

Table2. The comparison of average stress score after chemotherapy separately in both the study and control groups

Stress score after chemotherapy	Group						Independent T-TEST
	Music therapy		control		Total		
	Frequency	Mean±SD	Frequency	Mean±SD	Frequency	Mean±SD	
Pre-test	16	18.62±2.44	16	13.43±2.3	32	16.03±3.52	T=10.45 df=30 p=0.0001
Post-test	16	7.37±2.44	16	14.37±1.08	32	10.87±4.01	t=10.45 df=30 p=0.0001
pair t-test		df=15 t=9.18 P=0.0001		df=15 t=1.61 p=0.127			

Discussion

The fear of the side effects after chemotherapy in cancerous patients leads to stress and anxiety that increases the disease pain, so the inpatients listening to light music can make them calm and relaxed and kills the pain.

In the present study, there was no significant statistical difference between the stress scores of two groups of control and experimental (after one session of chemotherapy) before chemotherapy stating that one session chemotherapy is not effective in reducing the stress of the children with cancer. But the difference in the stress scores of the two groups of the experimental and control after one session chemotherapy was statistically significant and the experimental group's stress scores decreased dramatically after music therapy following chemotherapy.

In this study, in the intra-group comparison of the experimental group, there was a significant statistical difference in the stress scores. Also, there were 87.5% of the patients with stress (with scores over 10) before stressful patients chemotherapy and after one session of music therapy and it reduced to 18.75% after the complete course of chemotherapy and performing all sessions of musical therapy, which shows the positive and efficient effects of music therapy in reducing the stress following chemotherapy of the children. There

is no standard study about the effects of music therapy on stress in the cancerous children in Iran.

Motahedian et al. (2012) did a research on the effect of music therapy on postoperative pain intensity in patients under spinal Anesthesia. Findings of the study showed that hearing the music during surgery with spinal anesthesia can reduce postoperative pain (8).

Yousefi-Nejad (2005) observed the effects of music on the pain level in chronic cancer & suggested that there is a meaningful relationship between the pain level and the number of pain killers before and after music therapy (9).

O'Callaghan et al. (2013) conducted a qualitative study on the relationship between music therapy and the children suffering from cancer in the Cancer Center of Peter McCallum in Melbourne, Australia. They found out that music can help cancer and it can make children calm, lower stress, promote care relationships, self-care and make them hopeful (4).

Stanczyk (2011) performed a research on music therapy in supportive care of cancer in Poland. Some aspects of music functions in supportive care of cancer are shown in this study and music therapy can be a part of supplementary medicine in cancer to lower the related stress, pain and raise life quality (10).

Cantekin et al. (2013) did a study about the effects of music on stressful factors and the level of anxiety in hemodialysis patients in Meliksa University in Turkey. The findings suggested that music causes a meaningful decrease in anxiety level and stressful factors in hemodialysis patients and can be a part of nursing actions to help meet the physical and mental needs of these patients (11).

The study results of Nan-bakhsh et al. (2008) on the effects of music on decreasing pain and stress of birth deliveries demonstrated that listening to light music decreases the pain and anxiety of women while delivering baby (12).

Zengin et al. (2013) studied the effects of music on the pain and anxiety of the patients under Catheter port surgery in Turkey. The findings suggested that music significantly decreased the stress hormone level,

physiological parameters, pains and anxiety (13).

The results of the study by Rafieean et al. showed that music therapy has a significant effect on the level of anxiety, pain, vomit and vital signs of the patients under caesarian surgeries in Dr. Shariati hospital in Isfahan. Also, there was a meaningful difference between the sample and non-sample cases after music therapy in decreasing pain, anxiety, vital signs in caesarian women (14).

Vahhabi (2002) performed a research termed "the effects of the music therapy and physical relaxation on inpatients' anxiety in ICU". The results showed that music therapy lowered anxiety meaningfully (15).

Ghaderi et al. studied the effects of music on pain and anxiety and mind. Out of 238 received articles, 20 were chosen randomly that their main titles were the relationship of music with decreasing pain and anxiety and the results proved that music therapy has significant effects on pain and anxiety (5).

The study results by Shaabani et al. (2005) about the non-medicinal methods of muscular relaxation and music influencing the pain level of cancerous patients suggested that a meaningful difference was seen in the pain level of the patients before and after relaxation and music therapy ($P=0.001$). Also there was a significant difference in relaxation groups and music therapy groups which means pain has dropped a lot more in relaxation group than that of the music therapy ($P=0.016$)(16).

Mottahedian et al. (2012) performed a study on the impacts of music on post-surgery pain related to spinal anesthesia. The results implied that music therapy group patients displayed a meaningful decrease of pain level rather than the non-music group ($P=0.05$) and taking petedine in both groups was meaningful statistically ($P=0.041$) (17).

Sheybani Tazraji et al. (2009) surveyed the effects of music on depression and feeling of loneliness in the elderly people. The results indicated that the depression decreased a lot after music therapy. Also, women's depression got improved meaningfully in relationships and visiting their friends and family but

not in men (18).

Generally, regarding the music therapy effects the results stated are consistent with the findings of the present research and all of them represent the positive effects of music therapy. The limitations of the present study include the time limits of doing research and sampling duration being short.

The findings and results suggest that music therapy for cancerous children before and after chemotherapy sets their minds free from any anxiety. Light & relaxing music without lyrics are suggested.

It is recommended to conduct progressive and permanent studies on music in specific alternatives since music has better effects on decreasing stress and anxiety before and after chemotherapy in adults and also the health professionals get familiar with music therapy.

Conclusion

Music therapy is an efficient medium for impatient children suffering from cancer to have better feelings and cope with a cancerous life and adapt themselves to this life physically and mentally.

Conflict of interests

The authors declare that they have no competing interests.

Author's contributions

A.A Abbasi Esfajir and M.Nikkhah have contributed to the designing, writing, revising and approving the final manuscript. M.Nikkhah have performed data collection. M.A Heydari Gorji was involved in the study conception, design and material support. N.Aghaei was involved in the critical revisions for important intellectual content and review of content .

Acknowledgement

This study was an M.A student's thesis in clinical psychology from Islamic Azad Amol branch University of Research Sciences (code No. 23920705912011). We

appreciate and acknowledge the Research Education and Technology Deputy of the University contributing in this study. Also, we appreciate you and appreciate the cancerous children of Sari based Bu-Ali hospital cooperating with us despite all their problems; we express our sincere love to them.

References

1. Behrman RE, Kliegman RM, Jensen H. Nelson Textbook of Pediatrics, Cardiovascular System. Translated by Bynafr N. Tehran: Hayyan, Abasalh; 2011.
2. Nilsson U. The anxiety- and pain- reducing effects of music intervention: a systematic review. *AORN*. 2008; 87(4): 780-807. PMID: 18395022.
3. Hosseni AS. Effects of music therapy on reducing nausea and vomiting caused by chemotherapy in children with malignancy. *Journal of HAYAT*. 2009; 15(2): 5-14.
4. O'Callaghan C, Dun B, Baron A, Barry P. Music's relevance for children with cancer: music therapists' qualitative clinical data-mining research. *Soc Work Health Care*. 2013; 52(2-3): 125-143.
5. Ghaderi A, Abedi F, Molanaei A, Seyedshohadaei N. Effects of music therapy on pain and anxiety. *Journal Zankv (Student Research Committee)*. Available from www.zibaweb.com/Music%20Darmani.htm
6. Sharrer V, Ryan-Wenger NA. School-age children's self-reported stress symptoms. *Pediatric nursing*. 2002; 28(1): 21-27.
7. Valizadeh L, Farnam AR, Rhkar Farshi M. Investigation of stress symptoms among primary school children in the city of Tabriz. *JCS*. 2011; 6(4): 23-28.
8. Motahedian E, Movahedirad S, Hajizadeh E, Lak M. The effect of music therapy on postoperative pain intensity in patients under spinal anesthesia. *Iran J Crit Care Nurs*. 2012; 5(3): 139-144.
9. Youseffi-nejad Ostad kelayeh A, Madadi A, Majdzadeh SR, Shabannia R, Sadeghian N, Zarrinaraf AR et al . Effect of music on chronic cancer pain. *J of Qazvin Univ of Med Sci*. 2005; 1(34): 39-43.
10. Stanczyk MM. Music therapy in supportive cancer care. *Rep Pract Oncol Radiother*. 2011; 16(5): 170-172.
11. Cantekin I, Tan M. The influence of music therapy on

- perceived stressors and anxiety levels of hemodialysis patients. *Ren Fail.* 2013; 35(1): 105-109.
12. Nanbakhsh F, Zadeh Mohammadi A, Galili N, Ahmadnejad E. Music therapy interventions in reducing the pain and stress of labor. *University Medical Journal.* 2009; 20 (3): 209-214.
 13. Zengin S, Kabul S, Al B, Sarcan E, Doğan M, Yildirim C. Effects of music therapy on pain and anxiety in patients undergoing port catheter placement procedure. *Complement Ther Med.* 2013; 21(6): 689-696.
 14. Rafieean Z, Azarbarzin M, Saffarifard S. Determining effect of music therapy on anxiety, pain, nausea and vital signs of patients undergoing cesarean section at Shariati Hospital in Isfahan in 2006. *Medical Science Journal of Islamic Azad University.* 2009; 9 (1): 25-30.
 15. Siavash Wahhabi Y. The effect of music therapy and relaxation techniques on anxiety patients of cardiac intensive care unit. *Journal of Thought and Behavior.* 2002; 8(3): 75-82.
 16. Shaban M, Rasulzadeh N, Mehran A, Moradalizadeh F. Non pharmacological effects of music therapy and progressive muscle relaxation on cancer patient pain. *Journal of Nursing and Midwifery, Tehran University of Medical Sciences (Hayat).* 2006; 12(3): 63-72.
 17. Mottahedian Tabrizi A, Movahedi Rad S, Haji Zadeh E, Lak M. The effect of music therapy on postoperative pain intensity in patients undergoing spinal anesthesia. *Iran J Critical Care Nursing.* 2012; 5 (3): 139-144.
 18. Sheibani Tazraji F, PakDaman Sh, Dadkhah A, Hasanzadeh Tavakoli MR. The effect of music therapy on depression and loneliness in old people. *Iranian Journal of Ageing.* 2010; 5 (2): 54-60.