

Music Medicine Intervention – Based Program for Reducing Pain and Anxiety of Children Undergoing Bone Marrow Aspiration and Lumbar Puncture Procedures

Myasar Jasim Kalel, PhD¹ Adraa Hussein Shawq, PhD²

¹Academic Nurse, Ministry of Health, Nineveh Health Directorate,

²Assistant Prof., Department of Pediatric Nursing, College of Nursing, University of Baghdad, Baghdad

ABSTRACT

Music therapy is one of complementary methods, plays a key role in improving human health and controlling pain. Music therapy is a supportive profession, which can be used by patients diagnosed with different types of physical and psychological problems or social-emotional disorders. This study aims to Determine the effects of music therapy on child's anxiety undergoing lumbar puncture and bone marrow aspiration. And to find out the relationship between children's anxiety and pain with their socio-demographic characteristics during lumbar puncture and bone marrow aspiration procedures. A quasi experimental design was conducted among 78 pediatric patients who were recruited using a convenience sampling strategy, divided in to study and control groups. The data were collected using a self-report questionnaire and analyzed using descriptive statistics. The result of this study revealed that there is a high significant differences in state anxiety and physiological parameters of the children between the study and control group. this study concludes that use of music medicine intervention program were effective in reducing anxiety in children under going bone marrow and lumbar puncture procedures.

Keywords: music medicine; anxiety; bone marrow aspiration; lumbar puncture;

INTRODUCTION

Hospitalization, blood testing, and medical exams may be unpleasant for children with physical issues including pain and sickness. Stress in children may cause sleep, appetite, and developmental issues and delay illness recovery [1], Medical procedures may cause children and their families pain and anguish. When repeating these procedures throughout child diagnosis and treatment [2].

Cancer is the second greatest cause of death in children under 15 and the largest disease-related cause. Despite treatment improvements, its incidence and prevalence have grown recently. Experts and academics say cancer diagnosis is distressing and stressful for children and teenagers. Diagnostic testing, therapies, and frequent hospital visits can have psychological effects. The biggest side effects of cancer therapy and diagnosis include pain, depression, sleep difficulties, exhaustion, and anxiety [3]. Bone marrow aspiration and lumbar puncture are unpleasant medical procedures. Anxiety may also impact procedure pain [4]. Stress and anxiety include sudden traumatic events, long-term stress, and worries that happen every day [5]. As well simple people and scientists experience more anxiety awaiting the side effect that will appear on the medical procedure of vaccination [6].

Due of the anticipated discomfort, youngsters are very frightened during these treatments. Most oncological patients report severe pain throughout therapy, indicating poor pain management. Medical treatments may relieve anxiety if pain is managed properly. Cancer and immune system-afflicted youngsters recall pain. A child's recollection of painful procedures early in therapy might cause worry and anxiety before the following steps and anxiety disorders that make the future steps harder to accept. Anxiety is frequent in children, especially those with major health issues or undergoing medical procedures. Nurses must be able to manage unpleasant operations to decrease the physical and psychological impacts and avoid long-term repercussions [2]. feelings related to the disease, including fear, sadness, loneliness most of the time, lack of confidence in personal abilities, concern about being away from home, as well as discomfort and dissatisfaction with daily performance [7]. Hospitalization, diagnosis, and illness treatment may create medical, psychological, and social issues for the kid and family. meaning adjusting to changes in everyday responsibilities and routines [8]. As well as Parents of children with chronic illnesses may feel varying amounts of anxiety and disappointment, particularly at the earliest phases of their children's

diagnosis, and may suffer from a variety of negative psychological repercussions [9].

Music therapy, cognitive behavioral therapy, relaxation methods, and breathing exercises may help manage pain and anxiety. Music has been utilized in medicine to treat patients' physical, mental, and spiritual needs. Theory and research influence music therapy's professional practice. Musical experiences may include listening to live, improvised, or pre-recorded music, playing an instrument, improvising with voice or instruments, writing music, and utilizing music with other modalities like movement, pictures, or art. [3], Using non-pharmacological approaches may help limit opioid use and possibly detrimental physiological and psychological pain responses [10].

Recently Music improves therapeutic results for anxiety, relaxation, sadness, discomfort, and pain through affecting cognition, awareness, self-esteem, mood, motivation, and arousal [11]. Music may also decrease pain by shifting thoughts, inhibiting pain signals, and releasing endorphins. used to relax or sleep. Research in music therapy ranges from assessing its efficacy to examining music and sound's effects on the healing process [12].

Music may reduce pain and anxiety, boost relaxation and immunity, and lower blood pressure, pulse, and breathing. Music releases endorphins, which alter moods and relieve pain. It may also improve comfort [13, 14,15]. Songs may help youngsters learn

about vital issues like immunizations and health procedures and normalize their sentiments. [16].

MATERIAL AND METHODS

A quasi experimental design that implemented the interventional program to ascertain the effectiveness of the Music Medicine Intervention – Based Program for Reducing Anxiety of Children Undergoing Bone Marrow Aspiration and Lumber Puncture Procedures, The study is conducted in pediatric teaching hospitals at Ibn Al-Atheer Teaching Hospitals, Hematology and Oncology Unit at the Mosul City, In order to get reliable data and a representative sample, the non-probability convenience sample was selected for study comprised of (86) child sample is divided into two groups; (40) patients in the study group is exposed to the Music Medicine program and (38) patients are not exposed to the program, considered as a control group, all of the participants were selected from the Hematology and Oncology Unit. The two groups have proximately the same demographic characteristics.

The questionnaire in this study was developed by the researchers that consisted of 4 parts; the sociodemographic characteristics, physiological measurements, and the state-trait anxiety scale child version [17], All of the research tools used in this study were checked by a panel of experts in pediatric nursing, psychiatric nursing, pediatric physicians, and psychiatric physicians. The Cronbach s alpha coefficient of the questionnaire was 0.86.

RESULTS

Table (1) Distributions of Child and Family Sociodemographic Characteristic

Variable	Category	study	%	Control	%	Total	%
Child age	Early school age	13	16.7	6	7.7	19	24.4
	Middle school age	13	16.7	12	15.4	25	32.1
	Late school age	14	17.9	20	25.6	34	43.6
Gender	Male	19	24.4	20	25.6	39	50
	Female	21	26.9	18	23.1	39	50
Residence	Urban	20	25.6	17	21.8	37	47.4
	Rural	20	25.6	21	26.9	41	52.6
Father educational level	Illiteracy	16	20.5	15	19.2	31	39.7
	Primary	10	12.8	8	10.3	18	23.1
	Secondary	7	9.0	1	1.3	8	10.3
	Bachelor degree	7	9.0	14	17.9	21	26.9
Mother educational level	Illiteracy	26	33.3	19	24.4	45	57.7
	Primary	6	7.7	14	17.9	20	25.6

	Secondary	1	1.3	3	3.8	4	5.1
	Bachelor degree	7	9.0	2	2.6	9	11.5
Father occupation	Employee	13	16.7	6	7.7	19	24.4
	Worker	27	34.6	32	41.0	59	75.6
Mother occupation	Employee	2	2.6	2	2.6	4	5.1
	House keeper	38	48.7	36	46.2	74	94.9

No: Number, f: Frequency, %: Percentage

The table shows that half of children are males (50 %) while remaining are females. And the high age for children is from 10-12 years (43.6%) while the age group 8-10 is about (32.1%) and the rest is from 6-8 years old.

Concerning residency for children, the highest percentage refers to rural (52.6%). In the other hand the majority of father educational level is Illiteracy (39.6%) as a mother (57.7%). And the father and mother occupation they are an employee.

Table (2) Discription of Children Medical Procedure Data

Variable	Category	study	%	Control	%	Total	%
Type of procedure	Bone marrow	14	17.9	14	17.9	28	35.9
	Lumber puncture	26	33.3	24	30.8	50	64.1
Duration of procedure	6-10 min	20	50.0	8	21.1	28	35.9
	11-15 min	20	50.0	30	78.9	50	64.1
Number of Previous PM/LP	First time	4	10.0	2	5.3	6	7.7
	Second time	6	15.0	8	21.1	14	17.9
	Three and more	30	75.0	28	73.7	58	74.4
Number of Previous hospitalization	First time	0	0.0	0	0.0	0.0	0.0
	Less than 3	13	32.5	7	18.4	20	25.6
	3 and more	27	67.5	31	81.6	58	74.4

The table reveals that the higher percentage of procedures is lumbar puncture (64.1%) 26,24 is study and control respectively

The case has equals distribution according to duration of procedure while the control the majority of them has the long duration (78.9%)

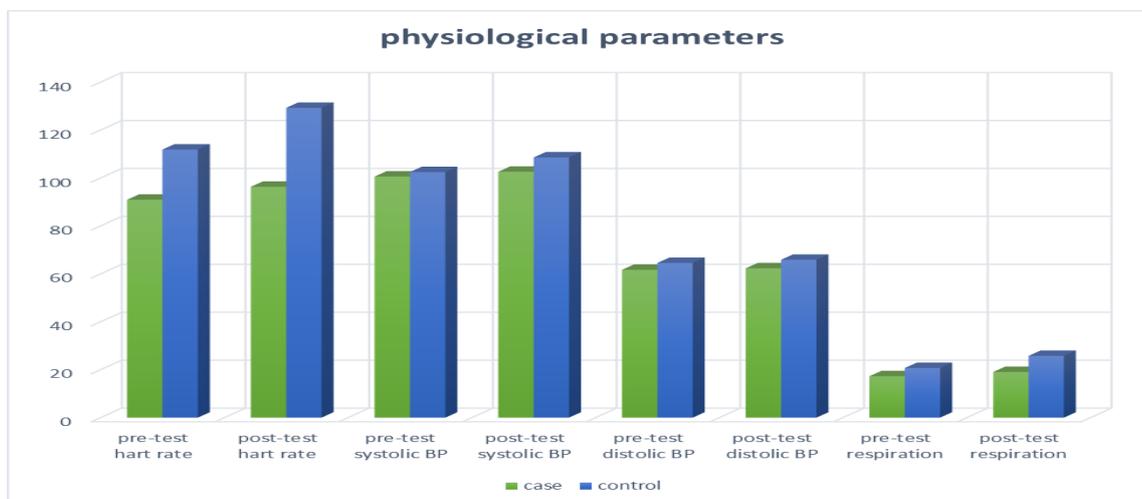


Figure (1) Mean Deference of Children Physiological Parameters

The figure shows a clear deference in the mean of children's physiological parameters records between the

study and control groups according to the pre and post-test measurements.

Table (3) Independent Samples Test for Children's Anxiety Level - Trait Anxiety Before Music Intervention Program (N=78)

Variable	Group	No.	Mean	SD	T	DF	Sig,
Trait Anxiety	Study	40	2.38	0.807	1.723	76	0.089
	Control	38	2.66	0.627			

M: Mean, SD: Standard deviation, t: t-test, df: Degree of freedom, Sig: Significance, p: Probability value at 0.01.

The table shows that there is no significant difference between study and control groups regarding the children's anxiety level - trait anxiety

Table (4) Independent Samples Test for Children's Anxiety Level - State Anxiety After Music Intervention Program (N=78)

Variable	Group	No.	Mean	SD	T	DF	Sig,
State Anxiety	Study	40	1.08	0.162	38.193	64.903	0.000
	Control	38	2.97	0.162			

M: Mean, SD: Standard deviation, t: t-test, df: Degree of freedom, Sig: Significance, p: Probability value at 0.01.

The table (3-4) shows that there is a highly significant difference between study and control groups regarding the children's anxiety level - state anxiety after use of music sessions

DISCUSSION

This study aims to Determine the effects of music therapy on child's anxiety undergoing lumber puncture and bone marrow aspiration. The key findings revealed that majority of the sample is control group was late school age (43.6), this finding similar to a study conducted by Showq and Maala [18] stat that more than half of children were early school age (6-8 years), another study conducted by Al-Musawi et al. [19] showed that (50%) of their sample within age groups (6-7) years, and (60%) were males

Also the result show that male-female ratio is (50-50) this finding are similar to the anther study that stat The study sample represents by approximately half of them (53.5%) are boys [20]. as well as Obaid et al [21] shows that majority (53.7%) of sample were males. While in Baghdad a study documented that, (93.6%) were girls [22].

And reveled that a high percentage in residency was rural (52.6) This result similar to previous studies that state that the majority of their sample was rural (87.1) [23]. In that context this finding was difference from a

study that point that majority of their sample was urban (80%) [24]

Also the parent educational level was illiterate (39.7 and 57.7) for father and mother respectively and even in occupation that is (75.6, 94.9) as worker father and housekeeper respectively, according to a research performed by Shawq et al., [25] finding a (24.4%) have a primary school education, and (65.8%) are housewives. While Ahmed & Maala (23) state that the educational level of fathers represents (44.2%) graduates from elementary school, while mothers of educational level represent (38.9%) reads and writes, while AL-jubouri & Alwan [26] state that heights percentage was father education of the children of their sample as Institute / College (28.2%) and for the mother was middle school (26.4)

The findings from the physiological parameters a high decrease in pretest hart rate, blood pressure, and respiratory rate and slow increase of posttest because the effects of use of music music, in the other hand the physiological parameters of control group that elevated of pretest and highly increase in posttest procedures due to anxiety. As well as a study was done by Umbrello and et al. [27] indicate in all of the studies included in their study, no statistically significant baseline differences between groups were detected. All

of the trials revealed a substantial decrease in anxiety at the conclusion of the music intervention. Music treatment resulted in an increase in sedation level or a decrease in the quantity of sedatives supplied in all investigations, as well as changes in physiologic parameters such as heart and respiratory rate and blood pressure. The groups who were exposed to music reported less discomfort.

The result of the study showed a non-significant difference between the study and control groups related to the trait anxiety level, in spite of the high significant difference between the study and control groups. This result supports previous studies regarding the effects of soothing music on increased state anxiety in individuals with a verified medical diagnosis of acute myocardial infarction will be investigated. The association between trait anxiety and baseline state anxiety was shown to be statistically significant. When the degree of change in post treatment state anxiety ratings was assessed as a net change as well as a percent change, statistically significant negative relationships were discovered. The findings showed that music therapy might be a useful strategy for reducing anxiety levels in patients suffering from an acute myocardial infarction [28].

Another study states that the Beck anxiety and depression inventory was utilized in a pre-test/post-test approach. After the intervention, the Wilcoxon statistical test for related groups in global scores revealed a substantial decrease. The findings show that music therapy was effective in reducing anxiety and depression levels in patients with generalized anxiety disorder, and the statistics show that the difference between pre-test and post-test results on the BAI is significant ($Z = 2.201$, $p.028$), and the difference between pre-test and post-test results on the Beck Depression Inventory is also significant ($Z = 2.023$, $p.043$). [29]

According to Rossetti et al. [30] music therapy substantially reduced patient anxiety and distress throughout the simulation technique, as measured by the State-Trait Anxiety Inventory questionnaire and the Symptom Distress Thermometer. Incorporating culturally based person-aliaed music therapy may be a useful technique for stress reduction.

CONCLUSION

This preliminary research on music therapy found that its use considerably decreased anxiety in children undergoing bone marrow aspiration and lumbar puncture procedures. As a result, it may be suggested

that health experts in our nation include music therapy into their intervention program. Further study may examine the application of music therapy in other disciplines and the long-term efficacy of this non-pharmacological treatment in patients. More follow-ups are recommended in future trials to assess the long-term consequences of this intervention. Furthermore, further study is needed to examine the impact of various psychological therapy on anxiety in patients.

Music therapy can be used as an alternative non pharmacological treatment in nursing interventions for patients suffering from anxiety and pain related to hospital environment and medical procedures. Teaching and learning the techniques and components of music therapy help nurses provide holistic palliative care that lead to decrease anxiety, pain and save time for patients. Nurses

The procedures of bone marrow aspiration and lumbar puncture are both painful and stressful for both the child and the medical team. The current study was successful in investigating the effect of music therapy on the severity of anxiety in children undergoing bone marrow aspiration and lumbar puncture; however, some limitations should be noted. One of the limitations of this study was the lack of blinding the study, which allowed participants to receive information from other sources or the interaction of patients with each other, as well as the building facility, which was affected by the war and suffering from the loss of most of the building and relying on caravans to present their services, both of which were beyond the researchers' control.

References

1. Kazemi, S., Ghazimoghaddam, K., Besharat, S., & Kashani, L. Music and anxiety in hospitalized children. *Journal of Clinical and Diagnostic Research*, 2012; 6(1), 94-96.
2. Ghanbari, N., Khankeh, H. R., Norouzi, K., & Mohammadi, A. Z. The Effect of Music Therapy on Pain and Anxiety of Children Diagnosed with Leukemia during Bone Marrow Aspiration and Lumbar Puncture Procedures. *Annals of the Romanian Society for Cell Biology*, 2021; 25(6), 19271-19286.
3. González-Martín-Moreno, M., Garrido-Ardila, E. M., Jiménez-Palomares, M., Gonzalez-Medina, G., Oliva-Ruiz, P., & Rodríguez-Mansilla, J. Music-based interventions in paediatric and adolescent's oncology patients: A systematic review. *Children*, 2021; 8(2), 73.

4. Özdemir, Ü., Taşcı, S., Yıldızhan, E., Aslan, S., & Eser, B. The effect of classical turkish music on pain severity and anxiety levels in patients undergoing bone marrow aspiration and biopsy. *Pain Management Nursing*, 2019; 20(1), 82-87.
5. Mohammed, Q. Academic-Related Stress and Responses of Nursing College Students in Baghdad University. *JNHS*, 2016;5(2), 63-69.
6. Kadhim, A. J. Nurses' Practices and Side Effects following the first dose of Pfizer Vaccine Injection at Iraqi Health Centers Affiliated to COVID-19 Corresponding author. *Teikyo Medical Journal*, 2022; 45(2)5643-5650.
7. Essawy, M. A., El Sharkawy, A., Al Shabbani, Z., & Aziz, A. R. Quality of life of children with sickle cell anemia. *IOSR J Nurs Health Sci*,2018; 7, 29-39.
8. Al-Musawi, K. M., Aldoori, N., Ajil, Z. W., Qasem, R., Ali, H., & Ammar, S. Daily Living Activities of School Age Children with Acute Lymphocytic Leukemia at Welfare Pediatric Teaching Hospital. *Indian Journal of Forensic Medicine & Toxicology*,2020; 14(3), 1411-1417.
9. Shawq, A. H., AL-Mousawi, K. M., & Ajil, Z. W. Effects of caring children with leukemia on their mother's psychosocial status. *Medico-Legal Update*,2020;20(3) 82-85.
10. Thbeet, H., & Shoq, A. H. Effectiveness of Non-Pharmacological Pain Management On Children Post-Surgery. *Mosul Journal of Nursing*,2022; 10(3), 206-211.
11. Hanser, S. B. Integrative health through music therapy: Accompanying the journey from illness to wellness. Springer.2016
12. Wigram, T., Saperston, B., & West, R. (Eds.). *Art & science of music therapy: A handbook*. Routledge.2013
13. Birnie, K. A., Chambers, C. T., Taddio, A., McMurtry, C. M., Noel, M., Riddell, R. P., & Shah, V. Psychological interventions for vaccine injections in children and adolescents: systematic review of randomized and quasi-randomized controlled trials. *The Clinical Journal of Pain*,2015; 31(10)
14. Birnie, K. A., Noel, M., Chambers, C. T., Uman, L. S., & Parker, J. A. Psychological interventions for needle-related procedural pain and distress in children and adolescents. *The Cochrane Database of Systematic Reviews*,2018; 10(10), CD005179.
15. Yinger, O. S., & Gooding, L. Music therapy and music medicine for children and adolescents. *Child and Adolescent Psychiatric Clinics*,2014; 23(3), 535-553.
16. Gooding, L. F., Knott, D., & Else, B. A. Music therapy and procedural support to aid vaccinations. *American Music Therapy Association*.2021, pp 2-1.
17. Rodrigues, P. F., Pandeirada, J. N., Bem-Haja, P., & França, J. The Trait Anxiety Scale for Children: A validation study for European Portuguese children and adolescents. *European Journal of Developmental Psychology*,2018; 15(4), 472-480
18. Shawq, A and Maala, E. Body satisfaction and depression symptoms among children with precocious puberty in Baghdad City. *Iraqi National Journal of Nursing Specialties*,2019; 32(1), 39-46.
19. Al-Musawi, K. M., Shawq, A. H., Majeed, Z., Zaid, S., & Ibraheem, H. Risk factors for congenital anomalies in neonatal intensive care unit in Baghdad city. *Medico Legal Update*, 2020;20(1), 1168-74.
20. Neamat, A. S., Shawq, A. H., & Mohammed, W. J. Association between Digital Addiction and Eating Behaviors for Preschool Children. *Mosul Journal of Nursing*,2023; 11(1), 1-6.
21. Obaid, K. B., Ajil, Z. W., Musihb, Z. S., Athbi, H. A., Al-Juboori, A. K. K., & Mahmood, F. M. Patterns of Diseases among Children's Pilgrims during Arba'een of Imam Hussein in Holy Kerbala City. *International Journal of Psychosocial Rehabilitation*,2020; 24(09).
22. Hamed F.A., Central Precocious Puberty of Patients Attending Welfare Teaching Hospital. (unpublished master thesis). College of Medicine. Baghdad.2015
23. Ahmed, S. S., & Mscn, E. G. A. M. A. Impact of Preventive Measures upon Children's Emotional Behaviors during COVID-19 Pandemic in Mosul City. *Pakistan Journal of Medical & Health Sciences*,2022; 16(03), 945-945.
24. Mohammed, A. Q., & Hatab, K. M. Quality of Life of Children age from (8-lessthan13) years with Acute Lymphocytic Leukemia Undergoing Chemotherapy. *Iraqi National Journal of Nursing Specialties*,2022; 35(1).

25. Shawq, A. H., Ajil, Z. W., & Al-Musawi, K. M. Attitudes of mothers towards over the counter antibiotics for their children in Baghdad city. *International Journal of Psychosocial Rehabilitation*,2020; 24(09).
26. AL-jubouri, S. M.& Alwan, I.H. Assessment of Psychological Adjustment among Preparatory School Students. *Iraqi National Journal of Nursing Specialties*, 2022;35(1).
27. Umbrello, M., Sorrenti, T., Mistraretti, G., Formenti, P., Chiumello, D., & Terzoni, S. Music therapy reduces stress and anxiety in critically ill patients: a systematic review of randomized clinical trials. *Minerva anestesologica*,2019; 85(8), 886-898.
28. White, J. M. Music therapy: an intervention to reduce anxiety in the myocardial infarction patient. *Clinical nurse specialist CNS*,1992; 6(2), 58-63.
29. Gutiérrez, E. O. F., & Camarena, V. A. T. Music therapy in generalized anxiety disorder. *The Arts in Psychotherapy*, 2015;44, 19-24.
30. Rossetti, A., Chadha, M., Torres, B. N., Lee, J. K., Hylton, D., Loewy, J. V., & Harrison, L. B. The impact of music therapy on anxiety in cancer patients undergoing simulation for radiation therapy. *International Journal of Radiation Oncology* Biology* Physics*,2017; 99(1), 103-110.