

The physical and psychological outcomes of art therapy in pediatric palliative care: A systematic review

Elahe Ghayebie Motlagh¹, Mahmoud Bakhshi^{2,3}, Nayyereh Davoudi², Ali Ghasemi⁴, Hossein Karimi Moonaghi²

¹Student Research Committee, School of Nursing and Midwifery, Mashhad University of Medical Sciences, Mashhad, Iran, ²Nursing and Midwifery Care Research Center, Mashhad University of Medical Sciences, Mashhad, Iran, ³Department of Medical-Surgical Nursing, School of Nursing and Midwifery, Mashhad University of Medical Sciences, Mashhad, Iran, ⁴Department of Pediatric Hematology and Oncology, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran

Background: The integration of art therapy in health care is a growing trend in the care of cancer patients. Therefore, this study aimed to identify the physical and mental benefits of art in children with cancer. **Materials and Methods:** A systematic review of English articles using Google Scholar, MEDLINE via PubMed, Scopus, the Cochrane Database of Systematic Reviews, and the Web of Science was conducted. Relevant keywords for cancer, child, art therapy and their synonyms were used accordingly. All searches were conducted to December 31, 2021. Relevant articles were included studies published in English and involving children aged 0–18 years. Studies evaluated the effects of art therapy in children with cancer. **Results:** Seventeen studies had inclusion criteria, of which 12 studies were performed by clinical trial and 5 studies were performed by quasi-experimental method. Sixteen studies evaluated one type of art-therapy intervention, while one study used a combination of art-therapy approaches. The results showed that art-based interventions in the physical dimension lead to more physical activity, stability in breathing, and heart rate, and these children reported less pain. In the dimensions of psychology had less anxiety, depression, and anger but at the same time had a better quality of life and more coping-related behaviors. **Conclusion:** It seems that the use of art therapy in pediatric palliative care with cancer can have good physical and psychological results for the child, but it is suggested to evaluate the effects of these interventions in children at the end of life.

Key words: Art therapies, cancer, neoplasm, pediatric

How to cite this article: Motlagh EG, Bakhshi M, Davoudi N, Ghasemi A, Moonaghi HK. The physical and psychological outcomes of art therapy in pediatric palliative care: A systematic review. *J Res Med Sci* 2023;28:13.

INTRODUCTION

Compared to the 1980s, the incidence of cancer in children has increased by 13%.^[1] Each year 400,000 children under the age of 19 are diagnosed with cancer each year.^[2] There are estimated to be 6 to 7 million cases of childhood cancer in the world between 2015 and 2030.^[3]

Children with cancer often receive invasive chemotherapy, radiation, and surgery. These treatments

have several physical side effects including fatigue, sleep disorders, nausea, and vomiting.^[4] On the other hand, children experience various psychosocial effects following loneliness and isolation, including sadness,^[5] anxiety and stress, depression,^[6] and anger.^[7] Also, pain as a major problem for cancer patients.^[8] In 49 to 62% of children, it is experienced as a constant pain^[9] which can lead to problems in the child's mental health.^[5]

Palliative care can be used to relieve pain and other symptoms of the patient's anxiety such as anxiety and depression, which seeks to increase the quality of

Access this article online	
Quick Response Code: 	Website: www.jmsjournal.net
	DOI: 10.4103/jrms.jrms_268_22

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

For reprints contact: WKHLRPMedknow_reprints@wolterskluwer.com

Address for correspondence: Dr. Hossein Karimi Moonaghi, Nursing and Midwifery Care Research Center, Mashhad University of Medical Sciences, Daneshgah Street, Mashhad, Iran.

E-mail: karimih@mums.ac.ir

Submitted: 09-Apr-2022; **Revised:** 28-Aug-2022; **Accepted:** 14-Sep-2022; **Published:** 16-Mar-2023

life of the child and family by providing holistic care.^[10] Complementary and alternative medicine (CAM), as part of the palliative care of children with cancer, refers to a group of various medical and health-care methods that are currently none other than Western conventional medicine.^[11] CAM can include the use of meditation, herbal remedies, homeopathy, hypnosis, and prayer.

Children and families seek noninvasive methods with easy access and cheap access to control complications and sometimes to complete treatment. 6%–91% of children with cancer^[12] use CAM.^[13]

Given that families usually do not inform the treatment staff about the use of these therapies,^[14] the biggest concern about the use of CAM is the unknown interaction between CAM and cancer treatment regimens;^[15] therefore, it is necessary to use methods that do not have these adverse effects.

The study by Sanchez et al (2015) showed that art therapy is one of the most common complementary medicine used by children with cancer.^[16] In the meantime, in addition to not having to worry about drug interactions, art therapy has been introduced as a useful tool to deal with stressful situations and increase self-esteem,^[17] which can lead to the provision of person-centered care.^[18] Art can be defined as music, performing arts (theater and dance), and visual and literary arts.^[19] Art therapy is defined by the American Art Therapy Association as the creative process of art production that can improve and enhance the physical, mental, and emotional well-being of individuals.

Although art therapy is accepted as one of the CAMs by medical rehabilitation centers around the world, few institutions use this method.^[20]

The results of the research show that most of the review studies have examined the effect of art therapy in adults with cancer, while children are not small adults and differ in the level of development and communication needs of adults,^[21] and they face communication barriers such as limitations in vocabulary and cognitive capacity. Therefore, the current literature lacks evidence to support art therapy in the population of children with cancer shows the need to review studies in this field.

The aim of this study was to identify the types of art therapy interventions and their effects in children with cancer.

METHODS

Search strategy

In this study, in order to find related articles, research questions based on Patient, Intervention, Comparison,

and Outcome were defined. The participants were patients under the age of 18 who are undergoing cancer treatments (chemotherapy, radiotherapy, surgery, or other medical procedures), the intervention was art interventions, comparisons were routine management (i.e. routine care and standard medical care) or no intervention, and outcomes were the results of the intervention on the physical, psychological, and other dimensions of the patients' lives.

Then, a comprehensive search was performed on MEDLINE via PubMed, Scopus, the Cochrane Database of Systematic Reviews, and the Web of Science. In order to avoid the search bias, only articles that were in English were entered in the time frame between 2000 and December 31, 2021. The keywords of cancer, child, and art therapy were used. These keywords were combined using operators (AND, OR, NOT). Referrals and references for original articles and related reviews were also searched. The International clinical trials registry platform, conferences, and congresses were also reviewed. Due to the difficulty of accessing unpublished studies in dissertations and articles published in low-cost sources, they were not reviewed. Duplicate studies and reports were eliminated based on screening titles.

Inclusion criteria

Experimental and semi-experimental studies that have been conducted on children with any type of cancer. published in English and involving children aged 0–18 years. Children receive art therapy intervention

Exclusion criteria included

Case studies or study protocols were excluded. Studies that provided intervention to families of children with cancer were also excluded

Study selection

This study was adjusted using the Preferential Items for Systematic Reviews and Meta-Analyses statement.^[22] All articles were retrieved by one reviewer (MF) using the electronic databases. After removing duplicate articles, titles and abstracts were screened for fulfilling the study inclusion and exclusion criteria. All potential full-text articles were retrieved and evaluated by the two reviewers independently. Although the level of agreement between the two reviewers was not specifically calculated, any disagreement on inclusion/exclusion of full-text articles was resolved by discussion [Figure 1].

Data extraction was carried out by two reviewers independently on the basis of a premade data extraction form. The following relevant data were collected: first author, country of intervention, year of publication, study

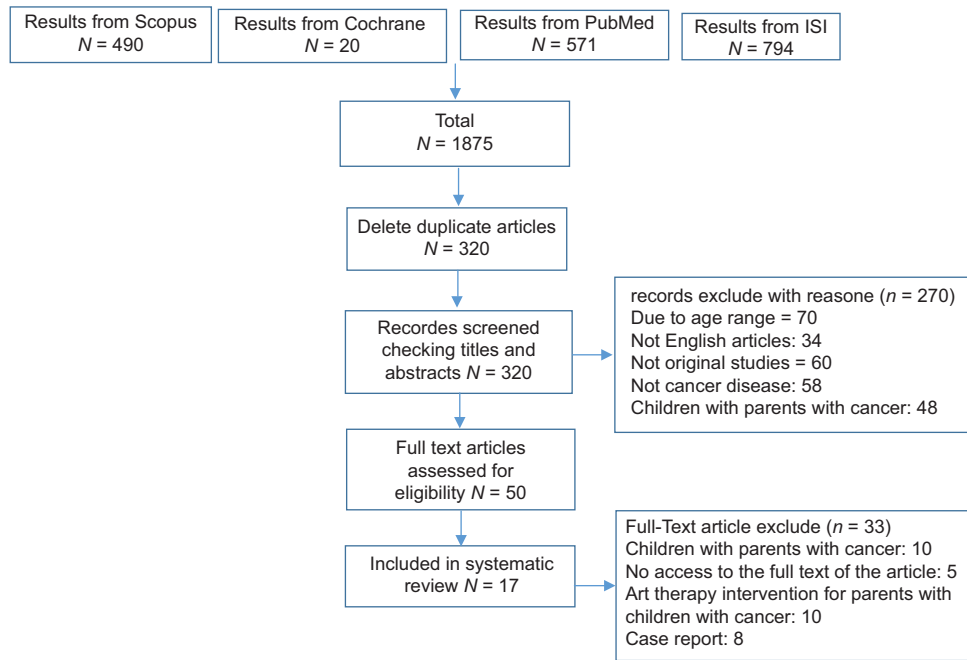


Figure 1: Flow diagram

design, participants, topics, duration of intervention, and subjective evaluations. Disagreements were discussed and judged by the third reviewer.

Quality assessment of study

The quality of the included studies was assessed with the “Standard Quality Assessment Criteria for Evaluating Primary Research from a Variety of Fields.”^[23] In Table 1, the results of quality assessment are presented. Since all values are above the cutoff point, no articles have been excluded. Values ranged from 0.63 to 0.96, documenting an overall good quality of the studies included.

The risk of bias^[24] was calculated for each included study, referring to the following types of bias: selection bias, performance bias, detection bias, attrition bias, reporting bias, and other biases.

RESULTS

Participants

Seventeen studies have been included in this review, including six studies on painting, one study on rhythmic movements, nine studies on music therapy, and a combined study of painting and music therapy.

A total of 729 children participated in these studies, of which 311 children were in painting studies, 31 children were in rhythmic movements, 5 children were in a combination of music and painting, and 382 children were in the music therapy group.

Table 1. Quality of included studies

Publication	Quality assessment
Meltem Gürcan, 2021 ^[27]	0/89
Abdulah, 2018 ^[28]	0/67
Naime Altay, 2017, ^[29]	0/77
Ebadinejad, 2017, ^[30]	0/68
Giordano, 2020, ^[31]	0/76
Kayla CarissaWong, 2021 ^[32]	0/86
Purrezaian 2020 ^[25]	0/8
Palvan, 2021, ^[40]	0/92
tahmasebi, 2017, ^[41]	0/84
Khodabakhshi, 2016, ^[33]	0/83
Nguyen, 2010, ^[34]	0/96
Ugglä L, 2018 ^[35]	0/77
Robb, 2017, ^[26]	0/87
Ugglä, 2016, ^[36]	0/69
Robb, 2008, ^[39]	0/87
BARRERA, 2002 ^[38]	0/85
Piasai, 2018, ^[37]	0/75

The sample size in these studies varied between 5 and 83 children in each study; in one study alone, the sample size was 5 children (on the drawing),^[25] in one study, the sample size was 16 children (music therapy),^[26] but the sample size in 11 studies was between 20 and 60 people,^[27-37] and the sample size was more than 60 people in four studies.^[38-41]

The age of participants in this study ranged from 0 to 17 years; the majority of studies were between 7 and 18 years old ($n = 10$),^[25,27-30,33,34,37,40,41] in three studies, the age of participants was 0 to 18 years,^[35,36,38] and in four studies, the age of participants was between 2 and 17 years.^[26,31,32,39]

Two studies were conducted on children undergoing bone marrow transplantation,^[35,36] and two studies were conducted when the child was undergoing surgery.^[34,31]

Study designs and quality assessment

In this review, 12 studies were performed randomized clinical trial (RCT)^[26,28,31-37,40,41] and 5 studies were performed without a control group and as a comparison before and after a group,^[25,29,30,32,38] of which one study in painting,^[29] one study in rhythmic movements,^[30] and two studies in music therapy,^[32,38] and one study was a combination of painting and music.^[25]

In these studies, Abdulah and Abdulla examined the effect of group art therapy on these children^[28] and Purrezaian *et al.* and Robb *et al.* examined the effect of family-centered art therapy.^[25,26]

In the RCTs that worked on the painting, the children in the control group received routine care that did not involve painting.^[27,28,33,41] In the study of Palvan *et al.* (2021), children in the intervention group drew in response to the drawings they received from their healthy peers, but in the control group, children did not receive drawings from their healthy peers.^[40]

In music therapy RCTs, the control group received different care; in the Nguyen *et al.*'s study, headphones were placed on the ear of the control group without playing a song.^[34] In Uggla *et al.*'s study, the control group received the intervention after discharge from the hospital.^[35] In Robb *et al.* and Robb *et al.*'s studies, children listened to an audio storybook.^[26,39]

Blinding in three studies, Nguyen *et al.* blinded the researcher and physicians,^[34] Gürcan and Atay Turan blinded the statistical analyst,^[27] and Palvan *et al.* blinded the participants.^[40] The random allocation method has been clearly stated in Nguyen *et al.*,^[34] Robb *et al.* (2008)^[39], Robb *et al.* (2017)^[26], and Abdulah and Abdulla^[25] using opaque envelopes, block making, and random allocation table, respectively.

Table 1 presents the results of the quality assessment. No article has been deleted since all values are above the cutoff point.

Types of art therapy intervention

Types of interventions

The studies included in this review can be divided into four categories: drawing/painting, music, rhythmic movements, and a combination of painting and music [Table 2]:

Paintings/drawing

The studies in this group have used various approaches, but the basic intervention has been painting.

In the studies of Abdullah *et al.*^[28] and Khodabakhshi Koolae *et al.*,^[33] children made handicrafts with wood or play dough and designed collages based on their drawings.

In the Tahmasebi *et al.*'s study, the children in the intervention group drew in groups, but the method of grouping and performing the intervention was not clarified.^[41]

In Altay *et al.* (2017) study, with the aim of identifying the child's psychological problems, they were asked to draw a picture of a child in the hospital.^[29] In the Gürcan *et al.* (2021) study evaluate the effectiveness of the effectiveness of mandala drawing. This type of painting starts from a central point and expands to infinity with nested circles.^[27]

The Palvan *et al.*'s (2016) study investigated the effect of painting exchange between children with cancer and healthy children. The intervention group painted in response to these paintings of their healthy peers.^[40]

Rhythmic movements

In this Ebadinejad *et al.*'s study group, children participated in six sessions of 45 min to perform rhythmic movements in hip-hop style.^[30]

Music

Different approaches have been used to use music in these children:

Two studies, Nguyen *et al.* and Giordano *et al.*, were performed on children under stressful LP conditions and before surgery,^[31,34] but different approaches were used. Nguyen *et al.*'s study listened to music using headphones 10 min before the operation, but Giordano *et al.*'s study developed an interactive approach for the child that included active techniques using different musical instruments, free improvisation, singing, and composing.

Two Uggla *et al.* and Uggla *et al.*'s studies were performed on children undergoing bone marrow transplantation; in these studies, the approach of selecting and conducting sessions was patient centered based on the child's initiatives.^[35,36]

In Robb *et al.*'s study, the intervention was presented in the form of parent-delivered active music engagement. In the sessions between the parents and the therapist, active music engagement activities were modeled based on the child's behavioral points.^[26]

Robb *et al.* study (2008) three approaches Compared; active music engagement, listening to music, and listening to audiobooks. Children in the active music engagement group

Table 2: Study characteristics.

Publication	Design	Subject	Intervention	Control	Result
Gürcan, 2021, ^[27]	Rct	n=60	mandala drawing	routine care	reducing anxiety and depressive
Abdulah, 2018 ^[28]	Rct	n=60	painting and handcrafting	routine care	physically active and energetic, less depressed and emotional
Naime Altay, 2017, ^[29]	Not-Rct	n=30	drawing and writing and mutual storytelling	No control	Reduces anxiety
Ebadinejad, 2017, ^[30]	Non Rct	n=31	Rhythmic movements	No control	reduced mild anxiety
Giordano, 2020, ^[31]	Rct	n=48	Music Therapy	Routin care	lower preoperative anxiety score
Kayla CarissaWong, 2021 ^[32]	Non rct	n=37	music therapy	No control	The child's performance in reaching the goal was higher
Purrezaian 2020, ^[25]	Non rct	n=5	Combined method of music, painting mandal	No control group	reducing depression and pain anxiety
Palvan, 2021 ^[40]	Rct	n=66	painting	they received no drawing from their peers	It did not affect the child's happiness
tahmasebi, 2017 ^[41]	Non-rct	n=65	painting	Routin care	Reduce depression
Khodabakhshi, 2016, ^[33]	semi-experimental	n=30	painting	Routin care	Reduce depression aggression
Nguyen, 2010, ^[34]	Rct	n=40	earphones with music	earphones without music	Reduce pain , anxiety and heart and respiratory rates
Uggla L, 2018 ^[35]	Rct	n=29	music therapy	Routin care	Increases the child's physical performance but not affect on pain
Robb, 2017, ^[26]	Rct	n=16	active music engagement	Audio Storybooks	reduce emotional distress.
Uggla, 2015, ^[36]	Rct	n=24	Music therapy	Routin care	reduced evening heart rates
Robb, 2008, ^[39]	Rct	n=83	music therapy	audio storybooks	higher frequency of coping-related behaviors; Positive facial effect and active engagement
Barrera, 2002 ^[38]	Non rct (pre-post)	n=65	music therapy	Routine care	Reduce pain, increases the child's activity in the play
Piasai, 2018 ^[37]	RCT	n=40	guided-imagination drawing storytelling	Routine care	increased happiness and relaxation

RCT=Randomized controlled trial

can choose and play from instruments or choose from the prepared songs and listen.^[39]

Barrera *et al.* in their study with an interactive approach have distinguished age groups in music selection; as adolescents and school-age children tended to write, improvise, and listen to prerecorded music, toddlers often became involved in playing instruments. Infants and toddlers participated in singing, playing songs, lullabies, and playing instruments.^[38]

Piasai *et al.* examined the effect of guided imagination and computer drawing-storytelling in which about 10 min of classical nonverbal music was used at the beginning and end of the recorded sound-guided imagination.^[37]

In Wong's study, children underwent music therapy as part of a rehabilitation program. In this regard, based on the preferences, ability, and age of the child, the therapist provided the appropriate music program to the child.^[32]

Combined

The Purrezaian *et al.*'s study used different approaches to painting, coloring, and listening to music for children that were family-centered interventions. In this approach, the predominant intervention was Mandela's painting, coloring,

and drawing, in which the child listened to music at the same time. Furthermore, in this intervention, children made handicrafts with colored dough based on their painting.^[30]

Outcome measurements and results

The results obtained in these studies can be presented based on the interventions as follows:

Painting

Most of the studies in this category have been done on the child's psychological variables such as anxiety and depression. Studies by Altay *et al.*,^[26] Khodabakhshi Koolae *et al.*,^[33] and Gürcan and Atay Turan^[24] using a self-administered questionnaire on children's anxiety showed that painting has a significant effect on reducing child anxiety.

Studies by Gürcan and Atay Turan,^[24] Tahmasebi *et al.*^[32] on children's depression have shown that the results of painting intervention are effective in improving children's depression.

Khodabakhshi Koolae *et al.*'s study using a self-administered questionnaire showed that painting significantly reduces child anger,^[33] but Palvan *et al.*'s study using a self-administered questionnaire showed that drawing with peers has no effect on children's happiness.^[40]

Abdullah's study (2018) showed that the group receiving the painting intervention were more energetic and active, had less anxiety and depression, and participated more in social activities, but had no difference in cognitive capacities from the control group.^[28]

Rhythmic movements

A study by Ebadinejad *et al.* on children's anxiety showed that the results support a significant reduction in child anxiety following rhythmic movements, and follow-up of children 3 weeks later found this reduction to be significant.^[30]

Music

Studies by Giordano *et al.*^[31] and Nguyen *et al.*^[34] assessed child anxiety in stressful preoperative and painful procedures. The results showed that music is effective in reducing child anxiety.

Studies by Nguyen *et al.* and Barrera *et al.* showed that pain was significantly reduced in the group receiving music therapy,^[34,38] but in Uggla *et al.*, the pain was reduced in the music therapy group after the intervention, but it was not statistically significant compared to the control group.^[36]

Piasai *et al.*'s study showed that listening to nonverbal classical music significantly increases children's happiness and relaxes the child.^[37]

Uggla *et al.*'s study showed that the music therapy group had a higher level of physical performance and the school performance score had a nonsignificant increase compared to the control group.^[35] Barrera *et al.* showed that adolescents and preschool children had better performance in the play, which shows the positive effect of music therapy on their physical activities.^[38]

Studies by Nguyen *et al.*, Uggla *et al.*, and Piasai *et al.* showed that art therapy significantly reduces heart rate and respiration rate and has no significant effect on SpO₂.^[34-37] The Piasai *et al.*'s study showed a significant reduction in BP,^[37] but this difference was not significant in the Nguyen *et al.* and Uggla *et al.*'s studies.^[34,36]

Behaviors related to patient coping were examined in studies by Robb *et al.* and Robb *et al.*^[26,39] An observational checklist was completed by the evaluators which showed that positive coping-related behaviors in the intervention group were significantly higher than the control groups.

In Robb's (2017) showed that playing music by the child was not effective in improving the mood of mothers and even caused more stress to the mother.^[26]

Wong's study (2021) showed that children in the intervention group were successful in managing stress and had more interaction with their peers and the treatment staff.^[32]

Combined

The results of Purrezaian *et al.*'s study using a self-administered questionnaire showed that children receiving the family-centered intervention and a combination of painting and music anxiety and depression were significantly less than before the intervention.^[25]

DISCUSSION

The present study was conducted to identify and collect various types of art therapy interventions and their effects in children under 18 years of age with cancer. Finally, 17 studies were included in this review. The results of the review generally indicate the positive effect of art therapy on physical health including increases children's activity levels while increasing their energy and the psychological items of the hospitalized child, including anxiety, depression, relaxation, and while physiological variables reduce heart rate and respiration rate, improve the quality of life and behaviors of coping related.

Diagnosis and treatment of cancer are associated with many stressful experiences for the child.^[29] Children with cancer experience high levels of depression and anxiety due to their physical symptoms, consequences, and treatment.^[27] Decreased energy level and fatigue in children following chemotherapy prevents them from doing daily activities and is a common side effect. These results are in line with Kievisiene *et al.*'s study and Tang *et al.*, which supports the positive effects of art therapy in controlling the physical side effects of chemotherapy, including fatigue.^[42,43]

The psychological effects of cancer have far-reaching outcomes on a child's quality of life and communication skills and can harm symptom management and adherence to treatment.^[44] The results of the present review support the positive role of art therapy in improving psychological variables and improving the quality of life of children, which is consistent with the Facchini and Ruini review study that showed that music therapy can improve the feeling of well-being and psychological consequences in this group of patients.^[45] The results of the research showed that most of the studies have been done on adults with cancer, which also support the positive role of art therapy in adults with cancer and believe that art therapy can have psychological consequences^[46,47] and fatigue^[46,48] and improve the quality of life of these people.^[46,48] Since it is difficult for children to express feelings and emotions,^[49] art, as one of the oldest means of communication,^[50] helps to express feelings and

conflicts,^[51] so it has been effective in reducing psychological problems in adults and children.

Children's happiness has been evaluated in two studies with conflicting results.^[37,40] It seems that in the Piasai *et al.*'s^[37] study, the aim is to study the effect of guided imagery and it cannot be said that the results are due to listening to music. Therefore, due to the heterogeneity of the type of interventions, differences in the duration of the intervention, sample size, and tools used, it cannot be said that art therapy has an effect on the child's happiness or is not effective.

Children who are hospitalized for cancer treatment feel lonely and entrapment.^[50] The results of the present review show the strengthening of interaction between children with family and other treatment staff, participation in social activities, improving social relationships, and successful management of stress and behavior following art therapy interventions. In this regard, the results of the Aguilar review also showed that art therapy can increase the communication of children with cancer with their families and health-care providers, and these children, in addition to developing coping skills, express their feelings better.^[50]

Pain is considered one of the worst experiences of this group of children.^[52] If left untreated or not treated well, pain often leads to long-term changes in the child's behavior, self-concept, and other psychological problems.^[34] The results of Li *et al.*'s meta-analysis on 381 adult patients with cancer showed that music therapy can be effective in reducing pain in these patients.^[53]

Kievisiene *et al.* showed that music therapy improves the quality of life of women with breast cancer and reduces the pain of these patients.^[42] However, contrary to the evidence that shows the positive effect of CAM in improving the condition of children with cancer, especially during painful procedures,^[54] the effect of art therapy has been studied in limited studies. In Nguyen *et al.* and Barrera *et al.*'s study, the intervention was effective.^[34,38] Only Nguyen *et al.*'s study evaluated a child's pain during invasive procedures. Ugglá *et al.*^[35] and Barrera *et al.*^[38] are two pilot studies with limited sample sizes and conflicting results. Therefore, considering the importance of the issue of pain in children, the results of the present review cannot confirm the effect of art therapy in controlling and improving the pain of children with cancer.

Children with hematological diseases are more likely to have posttraumatic stress disorder (PTSD),^[55] which is one of the most common symptoms of PTSD.^[36] The results of the present review showed that music-based art therapy interventions can reduce heart rate and respiration rate in children with cancer.

In a review of the pain and anxiety of children receiving invasive procedures, Klassen *et al.* showed that music can reduce the heart rate and respiration rate of these children.^[56] The results are also consistent with Mojtabavi *et al.*'s study, which found that music stimulates the cardiovascular autonomic nervous system, which can lead to increased parasympathetic activity and heart rate variability (HRV).^[57] It seems that the use of art therapy interventions for the child can lead to a relaxation response that reduces heart rate and respiration rate.^[58]

Although the results confirm the positive effect of family-centered art therapy on the child,^[25,26] but Robb's study (2017)^[26] shows that Mothers in the intervention group had more stress and endured more energy because they had to encourage their children to play music. Since family-centered art therapy can teach families how to communicate with their children in the hospital^[25] and has significant benefits for children, it is important to consider the effects and benefits of family-centered art therapy on the family as well.

Limitations

In this review, intervention studies from all types of pilot and non-RCT studies have been included, which can affect the overall conclusion due to the low sample size and the lack of a control group. On the other hand, only studies in English were included. Heterogeneity in the type of interventions and study design in addition to reducing the scope of generalization; studies cannot be examined in the form of meta-analysis.

CONCLUSION

According to the general result of this review, it can be said that art therapy has positive results on children with cancer. Because children's health-care workers seek comprehensive care for children with cancer, they need to transfer different and cost-effective approaches to physical and psychosocial care, such as art therapy, in their usual ways. Art therapy can be suitable for entering the clinic, but due to the heterogeneity of interventions and study plans, it is suggested that the interventions are standardized and people be trained to provide these interventions, and trained people be used in this field.

However, due to the importance of pain in children with cancer and child in the end of life, it seems that the importance of this issue has been ignored in the above studies and limited studies in this area were found that there is insufficient evidence. Therefore, it is necessary to evaluate the effectiveness of these interventions in studies with high sample size and quality of material.

Ethical issues

This study was conducted by reviewing the articles, therefore, no human or animal participated in it, therefore, taking an ethics approval was not required.

Financial support and sponsorship

This project was approved by the Vice Chancellor for Research, Mashhad University of Medical Sciences, Iran (No: IR.MUMS.NURSE.REC.1400.001).

Conflicts of interest

There are no conflicts of interest.

REFERENCES

- Palliative M. Committee OHC. Pediatric palliative care and hospice care commitments, guidelines, and recommendations. *Pediatrics*. 2013;132:966.
- World Health Organization. CureAll Framework: WHO Global Initiative for Childhood Cancer: Increasing Access, Advancing Quality, Saving Lives World Health Organization. Available from: <https://apps.who.int/iris/handle/10665/347370> 2021. [Last accessed on 2021 Oct 25].
- Ward ZJ, Yeh JM, Bhakta N, Frazier AL, Atun R. Estimating the total incidence of global childhood cancer: A simulation-based analysis. *Lancet Oncol* 2019;20:483-93.
- Hooke MC, Linder LA. Symptoms in children receiving treatment for cancer-part I: Fatigue, sleep disturbance, and nausea/vomiting. *J Pediatr Oncol Nurs* 2019;36:244-61.
- Linder LA, Hooke MC. Symptoms in children receiving treatment for cancer-part II: Pain, sadness, and symptom clusters. *J Pediatr Oncol Nurs* 2019;36:262-79.
- Lopez-Rodriguez MM, Fernández-Millan A, Ruiz-Fernández MD, Dobarrío-Sanz I, Fernández-Medina IM. New technologies to improve pain, anxiety and depression in children and adolescents with cancer: A systematic review. *Int J Environ Res Public Health* 2020;17:3563.
- Compas BE, Desjardins L, Vannatta K, Young-Saleme T, Rodriguez EM, Dunn M, *et al.* Children and adolescents coping with cancer: Self- and parent reports of coping and anxiety/depression. *Health Psychol* 2014;33:853-61.
- Deandrea S, Montanari M, Moja L, Apolone G. Prevalence of undertreatment in cancer pain. A review of published literature. *Ann Oncol* 2008;19:1985-91.
- Jibb LA, Nathan PC, Stevens BJ, Seto E, Cafazzo JA, Stephens N, *et al.* Psychological and physical interventions for the management of cancer-related pain in pediatric and young adult patients: An integrative review. *Oncol Nurs Forum* 2015;42:E339-57.
- De Clercq E, Rost M, Rakic M, Ansari M, Brazzola P, Wangmo T, *et al.* The conceptual understanding of pediatric palliative care: A Swiss healthcare perspective. *BMC Palliat Care* 2019;18:55.
- Kemper KJ, Vohra S, Walls R, Task Force on Complementary and Alternative Medicine, Provisional Section on Complementary, Holistic, and Integrative Medicine. American academy of pediatrics. The use of complementary and alternative medicine in pediatrics. *Pediatrics* 2008;122:1374-86.
- Bishop FL, Prescott P, Chan YK, Saville J, von Elm E, Lewith GT. Prevalence of complementary medicine use in pediatric cancer: A systematic review. *Pediatrics* 2010;125:768-76.
- Al-Qudimat MR, Rozmus CL, Farhan N. Family strategies for managing childhood cancer: Using complementary and alternative medicine in Jordan. *J Adv Nurs* 2011;67:591-7.
- Valji R, Adams D, Dagenais S, Clifford T, Baydala L, King WJ, *et al.* Complementary and alternative medicine: A survey of its use in pediatric oncology. *Evid Based Complement Alternat Med* 2013;2013:527163.
- Erdem E, Sezer Efe Y, Bayat M, Uslu N, Sivaci L, Yilmaz E. Complementary and alternative medicine methods used among Turkish pediatric oncology patients. *J Pediatr Nurs* 2020;52:e103-7.
- Sanchez HC, Karlson CW, Hsu JH, Ostrenga A, Gordon C. Complementary and alternative medicine use in pediatric hematology/oncology patients at the University of mississippi medical center. *J Altern Complement Med* 2015;21:660-6.
- Hart J. Art therapy and cancer care. *Alternat Complement Ther* 2010;16:140-4.
- Vaartio-Rajalin H, Santamäki-Fischer R, Jokisalo P, Fagerström L. Art making and expressive art therapy in adult health and nursing care: A scoping review. *Int J Nurs Sci* 2021;8:102-19.
- McManus IC, Furnham A. Aesthetic activities and aesthetic attitudes: Influences of education, background and personality on interest and involvement in the arts. *Br J Psychol* 2006;97:555-87.
- Bitonte RA, De Santo M. Art therapy: An underutilized, yet effective tool. *Ment Illn* 2014;6:5354.
- Sneha LM, Sai J, Ashwini S, Ramaswamy S, Rajan M, Scott JX. Financial burden faced by families due to outofpocket expenses during the treatment of their cancer children: An Indian perspective. *Indian J Med Paediatr Oncol* 2017;38:4-9.
- Moher D, Liberati A, Tetzlaff J, Altman DG, Group P. Preferred reporting items for systematic reviews and meta-analyses: The PRISMA statement. *Ann Intern Med* 2009;151:264-9.
- Kmet LM, Cook LS, Lee RC. Standard quality assessment criteria for evaluating primary research papers from a variety of fields. *Canadian: Calgary*;2004.
- Higgins JP, Altman DG, Gøtzsche PC. The Cochrane Collaboration's tool for assessing risk of bias in randomised trials. *Bmj* 2011;343:1-9.
- Purrezaian H, Besharat MA, Koochakzadeh L, Farahani H. Development and effect-evaluation of a new family-based art therapy on depression and pain anxiety of the hospitalized children with cancer. *Clin Psychol Stud* 2020;10:21-42.
- Robb SL, Haase JE, Perkins SM, Haut PR, Henley AK, Knafel KA, *et al.* Pilot randomized trial of active music engagement intervention parent delivery for young children with cancer. *J Pediatr Psychol* 2008;42:208-19.
- Gürçan M, Atay Turan S. The effectiveness of mandala drawing in reducing psychological symptoms, anxiety and depression in hospitalised adolescents with cancer: A randomised controlled trial. *Eur J Cancer Care*. 2021;30:e13491.
- Abdulah DM, Abdulla BM. Effectiveness of group art therapy on quality of life in paediatric patients with cancer: A randomized controlled trial. *Complement Ther Med* 2018;41:180-5.
- Altay N, Kilcarslan-Toruner E, Sari Ç. The effect of drawing and writing technique on the anxiety level of children undergoing cancer treatment. *Eur J Oncol Nurs* 2017;28:1-6.
- Ebadinejad Z, Rassouli M, Payandeh A, Zahed G, Dashtgard A, Sarvari MH. The Effect of Rhythmic Movements on Mild Anxiety in Children of 7 to 12 Years Old with Cancer. *Supportive and Palliative Care in Cancer*. 2017;1:17-20.
- Giordano F, Zanchi B, De Leonardi F, Rutigliano C, Esposito F, Brienza N, *et al.* The influence of music therapy on preoperative anxiety in pediatric oncology patients undergoing invasive procedures. *Arts Psychother* 2020;68:1-5.
- Wong KC, Tan BW, Tong JW, Chan MY. The role of music therapy for children undergoing cancer treatment in Singapore. *Healthcare (Basel)* 2021;9:1761.
- Khodabakhshi Koolae A, Vazifehdar R, Bahari F. Impact of

- painting therapy on aggression and anxiety of children with cancer. *Caspian J of Pediatr* 2016;2:135-41.
34. Nguyen TN, Nilsson S, Hellström AL, Bengtson A. Music therapy to reduce pain and anxiety in children with cancer undergoing lumbar puncture: A randomized clinical trial. *J Pediatr Oncol Nurs* 2010;27:146-55.
 35. Uggla L, Bonde LO, Hammar U, Wrangsjö B, Gustafsson B. Music therapy supported the health-related quality of life for children undergoing haematopoietic stem cell transplants. *Acta Paediatr* 2018;107:1986-94.
 36. Uggla L, Bonde LO, Svahn BM, Remberger M, Wrangsjö B, Gustafsson B. Music therapy can lower the heart rates of severely sick children. *Acta Paediatr* 2016;105:1225-30.
 37. Piasai K, Phumdoung S, Wiroonpanich W, Chotsampancharoen T. A randomized control trial of guided-imagination and drawing-storytelling in children with cancer. *Pac Rim Int J Nurs Res* 2018;22:386-400.
 38. Barrera ME, Rykov MH, Doyle SL. The effects of interactive music therapy on hospitalized children with cancer: A pilot study. *Psychooncology* 2002;11:379-88.
 39. Robb SL, Clair AA, Watanabe M, Monahan PO, Azzouz F, Stouffer JW, *et al.* A non-randomized [corrected] controlled trial of the active music engagement (AME) intervention on children with cancer. *Psychooncology* 2017;17:699-708.
 40. Palvan S, Zareii K, Sadat Hoseini AS, Haghani H. The effect of exchanging drawings with peers on the happiness of children with cancer, aged 7-11 years: A clinical trial. *PLoS One* 2021;16:e0257867.
 41. Tahmasebi Z, Maghsoudi J, Talakoub S. The effect of painting on depression in children with cancer undergoing chemotherapy. *Iran J Nurs Midwifery Res* 2017;22:102.
 42. Kievisiene J, Jautakyte R, Rauckiene-Michaelsson A, Fatkulina N, Agostinis-Sobrinho C. The effect of art therapy and music therapy on breast cancer patients: what we know and what we need to find out—a systematic review. Evidence-based complementary and alternative medicine. 2020;2020.
 43. Tang Y, Fu F, Gao H, Shen L, Chi I, Bai Z. Art therapy for anxiety, depression, and fatigue in females with breast cancer: A systematic review. *J Psychosoc Oncol* 2019;37:79-95.
 44. Malbasa T, Kodish E, Santacroce SJ. Adolescent adherence to oral therapy for leukemia: A focus group study. *J Pediatr Oncol Nurs* 2007;24:139-51.
 45. Facchini M, Ruini C. The role of music therapy in the treatment of children with cancer: A systematic review of literature. *Complement Ther Clin Pract* 2021;42:101289.
 46. Bosman JT, Bood ZM, Scherer-Rath M, Dörr H, Christophe N, Sprangers MA, *et al.* The effects of art therapy on anxiety, depression, and quality of life in adults with cancer: A systematic literature review. *Support Care Cancer* 2021;29:2289-98.
 47. Jiang XH, Chen XJ, Xie QQ, Feng YS, Chen S, Peng JS. Effects of art therapy in cancer care: A systematic review and meta-analysis. *Eur J Cancer Care* 2020;29:e13277.
 48. Ding Z, Ouyang Y, Zhang N. Painting therapy in cancer care: A descriptive systematic review. *Open J Nurs* 2019;9:89.
 49. Rollins J, Drescher J, Kelleher ML. Exploring the ability of a drawing by proxy intervention to improve quality of life for hospitalized children. *Arts Health* 2012;4:55-69.
 50. Aguilar BA. The efficacy of art therapy in pediatric oncology patients: An integrative literature review. *J Pediatr Nurs* 2017;36:173-8.
 51. Durualp E, Altay N. A comparison of emotional indicators and depressive symptom levels of school-age children with and without cancer. *J Pediatr Oncol Nurs* 2012;29:232-9.
 52. Hedström M, Haglund K, Skolin I, von Essen L. Distressing events for children and adolescents with cancer: Child, parent, and nurse perceptions. *J Pediatr Oncol Nurs* 2003;20:120-32.
 53. Li Y, Xing X, Shi X, Yan P, Chen Y, Li M, *et al.* The effectiveness of music therapy for patients with cancer: A systematic review and meta-analysis. *J Adv Nurs* 2020;76:1111-23.
 54. Massimo LM, Zarri DA. In tribute to Luigi Castagnetta-drawings. A narrative approach for children with cancer. *Ann N Y Acad Sci* 2006;1089:xvi-xxiii.
 55. Fukunishi I, Tsuruta T, Hirabayashi N, Asukai N. Association of alexithymic characteristics and posttraumatic stress responses following medical treatment for children with refractory hematological diseases. *Psychol Rep* 2001;89:527-34.
 56. Klassen JA, Liang Y, Tjosvold L, Klassen TP, Hartling L. Music for pain and anxiety in children undergoing medical procedures: A systematic review of randomized controlled trials. *Ambul Pediatr* 2008;8:117-28.
 57. Mojtavavi H, Saghadzadeh A, Valenti VE, Rezaei N. Can music influence cardiac autonomic system? A systematic review and narrative synthesis to evaluate its impact on heart rate variability. *Complement Ther Clin Pract* 2020;39:101162.
 58. Benson H. The relaxation response: Therapeutic effect. *Science* 1997;278:1694-5.