

The effect of music interventions on fatigue in patients with hematological cancers: A systematic review and meta-analysis of randomized controlled trials

Merve Gozde Sezgin (✉ gozdesezgin1990@gmail.com)

Akdeniz Üniversitesi: Akdeniz Üniversitesi <https://orcid.org/0000-0001-9076-2735>

Hicran Bektas

Akdeniz University: Akdeniz Üniversitesi <https://orcid.org/0000-0002-3356-3120>

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Abstract

Purpose

To systematically synthesize the effect of music interventions applied to patients with hematological cancer on fatigue.

Methods

The searches were conducted on PubMed, Web of Science, EBSCOhost/CINAHL Complete, Science Direct, Scopus, Cochrane Library, Ovid, ProQuest, and Springer Link databases until August 2021 without any year limitation. Comprehensive Meta-Analysis 3 software was used in the analysis of meta-analysis data. The meta-analysis was carried out following the PRISMA checklist. Risks of bias were examined by two independent researchers using the Cochrane Collaboration tool.

Results

Six randomized controlled trials consisting of 279 participants were included in the systematic review and meta-analysis. The count of music interventions in the included studies ranged between 1 and 8 sessions, each of which was 20 to 45 min long. The music interventions applied to patients with hematological cancers were found to be effective in reducing the severity of fatigue (95% CI= 0.10~0.57; Hedge's $g=0.03$; $p=0.006$).

Conclusions

The findings of the meta-analysis indicated that music interventions made important and positive contributions to reducing fatigue in patients with hematological cancer. Music interventions are a convenient method to reduce fatigue because they are comfortable and noninvasive. It will be beneficial to increase the awareness of nurses about the implementation of music interventions. It is recommended that music interventions applied to patients with a diagnosis of hematological cancer should be considered interventions that can be used together with other non-pharmacological or pharmacological methods to reduce fatigue.

Introduction

Hematological cancers are characterized by variable clinical, genetic, and pathological features [1, 2]. According to the data of the World Health Organization (WHO), the prevalence of hematological cancers varies by 16.5% (lymphoma: 8.1%; leukemia: 6.1%; multiple myeloma: 2.3%) [3]. The incidence of hematological cancers is lower than all cancers, but they can cause serious health problems. Patients with a hematological cancer diagnosis may show many symptoms, such as fatigue, weakness, neutropenia, or peripheral neuropathy, depending on the stage of the disease and treatment options [4, 5]. Fatigue is among the most persistent and common side effects seen in approximately 80% of patients with hematological cancers [6, 7]. Fatigue is a very common symptom in patients with hematological cancers, and patients' quality of life, functional status, and daily living activities may be adversely affected in this process [8–10]. Recently, meta-analysis and systematic review studies on fatigue management in patients with cancer have shown that the use of non-pharmacological methods, such as massage therapy, acupressure, reflexology, or acupuncture, is beneficial in fatigue management [11–13].

Music interventions applied to reduce the severity of fatigue provide high applicability, arouse positive emotions, and ensure patients' well-being [9, 14, 15]. Many factors, such as treatment options, stress, sleep problems, side effects of drugs, and infection affect fatigue in patients diagnosed with hematological cancer. All these processes negatively affect patients' quality of life, daily living activities, familial processes, and functional status [1, 2, 7, 15].

Non-pharmacological methods are comfortable, economical, and practical applications because they do not require invasive interventions [10, 16, 17]. Music is an ideal option in terms of providing creative art therapy and a therapeutic relationship, which is preferred in patients with cancer. Music interventions affect the functional processes in the brain, thereby providing endorphin, dopamine, and serotonin stimulation and rapidly activating the neural pathways. Thus, positive and pleasant emotions increase, and the severity of fatigue is alleviated [15, 18, 19].

Different studies have been reported in RCTs, systematic reviews, and meta-analyses in the literature about the effects of music interventions on patients with hematologic cancers. Music interventions have beneficial effects on pain, anxiety, depression, and quality of life. Similar results were found in two systematic review and meta-analysis studies examining the effects of music interventions applied to cancer patients on pain, anxiety, and depression levels, and it was reported that the method was effective [20, 21]. In two studies, the positive effects of music interventions applied to cancer patients on pain were examined [22, 23]. In another study, only the anxiety parameter was examined, and the method was reported to be effective [24]. In the study by Li et al. [25], it was stated that music interventions were effective in improving the quality of life, pain, depression, and anxiety levels in cancer patients.

Nurses have important responsibilities in detecting, preventing, and controlling the symptoms of patients with hematological cancer in the early period, increasing their quality of life and functional status, and providing appropriate nursing processes based on guidelines [26, 27]. They make important contributions to diagnosing fatigue, informing patients about it, determining its severity, following it regularly, managing it, and discovering music-related complementary therapies [9, 10, 14].

Methods

Design

A systematic review and meta-analysis was planned to investigate the effects of music interventions administered to patients with hematological cancer on fatigue. This systematic review and meta-analysis was conducted according to the Cochrane Handbook for Systematic Reviews version 6.2 [28] and reported

according to the Preferred Reporting Items for Systematic Reviews and Meta-analysis (PRISMA) statement checklist (Supplementary File 1) [29]. It was registered to the PROSPERO (Protocol code: CRD420XXXXX).

Search methods

To determine the effect of planned music interventions on patients with hematological cancer who had fatigue problems, studies published in English were searched without any year limitation. Two independent researchers searched PubMed, Web of Science, EBSCOhost/CINAHL Complete, Science Direct, Scopus, Cochrane Library, Ovid, ProQuest, and Springer Link databases until August 2021. Studies to be included in the study were searched according to the following MeSH keywords and their combinations: "hematological cancer," "music," "fatigue," and "clinical trials" (Supplementary file 2). Inclusion and exclusion criteria for the studies were determined according to the PICOS elements [28].

The inclusion criteria are listed below:

[P] Population: studies conducted with individuals who were aged 18 or older, was diagnosed with at least one type of hematological cancer were at any stage of hematological cancer, and were experiencing fatigue symptoms associated with hematological cancer, regardless of gender and ethnicity,

[I] Intervention: all kinds of music initiatives,

[C] Comparison: studies comparing the intervention to standard care or control groups with no intervention,

[O] Outcomes: studies that examined the symptoms of fatigue as a primary or secondary outcome and include fatigue scores,

[S] Study design: randomized controlled trials published only in English were included in the study.

The exclusion criteria are listed below:

Non-randomized controlled trials, cross-sectional, case-control, cohort, prospective, retrospective, protocol, abstracts, case reports, and studies published in languages other than English that implemented two music interventions or compared music interventions without a control group were excluded.

Quality appraisal

The included studies in the current study were evaluated by two independent authors using the Cochrane risk-of-bias assessment tool and randomization process in terms of deviations from the intended interventions, missing outcome data, measurement of the outcome, selection of the reported result, and overall bias criteria [30]. There was no disagreement or inconsistency between the authors. The bias risk of the included studies was assessed as high risk, some concerns, and low risk.

Data extraction and synthesis

The two independent authors designed an evaluation form on Microsoft Excel software. The form included the following criteria for the studies: author, year, country, participants, the type, duration, and frequency of music interventions, control groups, outcome criteria, and results. The data were extracted and evaluated based on this form. In the meta-analysis, the sample sizes of the control and intervention groups, mean pre-post test scores, and standard deviations were calculated. Studies with incomplete data were excluded from the meta-analysis. Eventually, six studies were included in the meta-analysis. The data were examined by two independent researchers and made suitable for the analysis.

The meta-analysis data were analyzed on the Comprehensive Meta-Analysis (CMA) V.3 software [31]. To calculate the effect sizes of the included studies, pretest/posttest standard deviations, mean scores of the fatigue scales, and sample sizes were used. The effect sizes of the studies were calculated using Hedge's *g* [large ($d \geq 0.80$), medium ($0.20 < d < 0.80$) and small ($d \leq 0.20$)] [32]. Cochran's *Q* statistic ($p < 0.10$) and I^2 coefficient were used for the heterogeneity test [(heterogeneity might not be important: 0%-40%), (moderate heterogeneity: 30%-60%), (substantial heterogeneity: 50%-90%), and (considerable heterogeneity: 75%-100%)] [29]. A random-effects model was used for the overall effect of music interventions on reducing the severity of fatigue [28]. Sensitivity analysis was performed in line with the meta-analysis data, and the presentation of the findings showed how carefully the study was conducted. The heterogeneity analysis of each study included and the determination of the source of heterogeneity was defined as a sensitivity analysis [28]. The Tau coefficient and Orwin's fail-safe *N* were used to determine the publication bias. Begg's adjusted rank correlation test and Egger's regression test were used to determine the publication bias in the funnel plot [34, 35].

Results

Literature search outcomes

A total of 394 studies were accessed as a result of database searches. Duplicate studies were eliminated using EndNote 20 software, and 11 studies were selected for full-text review. Based on the inclusion criteria, five of these studies were excluded from the review. Eventually, full-text studies that met the inclusion criteria were reviewed, and thus the results of six studies were included in the meta-analysis (Fig. 1).

Insert Fig. 1 here

Characteristics of the included studies

The six randomized controlled trials included in the study consisted of 279 participants. All studies were conducted in the US. All participants were diagnosed with hematological cancer, and the mean age in four of the studies ranged from 50 to 62.6 [9, 10, 16, 17]. The mean and standard deviation values of the patients' ages were not given in two of the studies [14, 36] (Table 1). There were no findings in the included studies addressing the possibility of intervening variables that may also contribute to the alleviation of fatigue [9, 10, 14, 16, 17, 36].

Table 1
Characteristics of included studies

Author, Year, Country	Participants	Age (mean ± SD)	Music type and intervention	Duration and frequency of music	Control Group	Outcome Criteria	Results
Cassileth et al., 2003, USA	Hodgkin, Non-Hodgkin, Lymphoma, and Myeloma Music Group: 34 Control Group: 26	Music Group: 53 Control Group: 51	<ul style="list-style-type: none"> • Passive listening • Individualized live music • Music therapist: Certified professional 	<ul style="list-style-type: none"> • Duration: 20–30 min. • Frequency: as per requirement • Number of sessions: 3–7 	Standard care	POMS	It was reported that there was a statistically significant decrease in fatigue scores of patients with cancer-related fatigue compared to the control group (p = 0.02).
Burns et al., 2008, USA	Leukemia and High-grade Non-Hodgkin lymphoma Music Group: 25 Control Group: 24	Music Group: 52.47 ± 15.36 Control Group: 55.53 ± 15.88	<ul style="list-style-type: none"> • Passive listening • Images accompanied by classical and modern music • Music therapist: Certified professional 	<ul style="list-style-type: none"> • Duration: 45 min. • Frequency: two times a week • Number of sessions: 8 	Standard care	Fatigue (FACIT-F)	It was reported that there was a statistically significant decrease in fatigue scores of patients with cancer-related fatigue compared to the control group (p < 0.001).
Rosenow and Silverman, 2014, USA	Leukemia and Multiple myeloma Music Group: 8 Control Group: 10	Music Group: 55.25 ± 7.19 Control Group: 50.00 ± 7.36	<ul style="list-style-type: none"> • Passive listening • Live music made with acoustic guitar preferred by the patient • Music therapist: Certified professional 	<ul style="list-style-type: none"> • Duration: 30–45 min. • Frequency: one time a week • Number of sessions: 1 	Standard care	BFI	It was reported that there was no statistically significant decrease in fatigue scores of patients with cancer-related fatigue compared to the control group (p = 0.173).
Bates et al., 2017, USA	Lymphoma and Myeloma Music Group: 37 Control Group: 45	Music Group: 58 Control Group: 58	<ul style="list-style-type: none"> • Passive listening • Live music made with keyboard and/or acoustic guitar • Music therapist: Certified professional 	<ul style="list-style-type: none"> • Duration: 30 min. • Frequency: No information • Number of sessions: 2 	Standard care	POMS	It was reported that there was no statistically significant decrease in fatigue scores of patients with cancer-related fatigue compared to the control group (p = 0.30).
Herband and Silverman, 2020, USA	Lymphoma and Leukemia Music Group: 18 Control Group: 17	Music Group: 62.6 ± 12.05 Control Group: 59.93 ± 13.57	<ul style="list-style-type: none"> • Passive listening • Live music made with acoustic guitar, which is selected from a “songs” menu • Music therapist: certified professional 	<ul style="list-style-type: none"> • Duration: 20–30 min. • Frequency: No information • Number of sessions: 1 	No intervention	VAS-F	It was reported that there was a statistically significant decrease in fatigue scores of patients with cancer-related fatigue compared to the control group (p = 0.004).
Reimnitz and Silverman, 2020, USA	Hodgkin, Non-Hodgkin, lymphoma, Myeloma, and Leukemia Music Group: 18 Control Group: 17	Music Group: 57.12 ± 15.41 Control Group: 58.94 ± 11.97	<ul style="list-style-type: none"> • Passive listening • Live music made with acoustic guitar • Music therapist: Certified professional 	<ul style="list-style-type: none"> • Duration: 20–30 min. • Frequency: No information • Number of sessions: 1 	No intervention	VAS-F	It was reported that there was a statistically significant decrease in fatigue scores of patients with cancer-related fatigue compared to the control group (p = 0.03).
The Profile of Mood States: POMS, The Lee Visual Analog Scale for Fatigue: VAS-F, Brief Fatigue Inventory: BFI							

Insert Table 1 here

Features of the music interventions

All included studies were conducted using passive and/or instrumental music. Acoustic guitar or a keyboard was preferred as the instrumental music type. In one study, individualized sessions with live music were administered to patients and the timing of the next visit was discussed after music therapy, considering the patients' mood, mental state, the severity of physical symptoms, and coping skills [36]. In another study, music therapies in sessions applied to patients consisted of two components, education, and experience. With these components, it is designed for patients to apply music imagery techniques, to have a successful musical image experience, and to answer all problems that may be related to the use of music images by music therapists. Additionally, during the sessions, patients were shown images accompanied by classical or modern music, and their emotional state and energy levels were evaluated [16]. In another study, hospitalized patients received music therapy with acoustic guitar and were asked to reassess their level of relaxation, anxiety, pain, nausea, and fatigue immediately after the session. Additionally, in the study, musical qualities were matched with the patients' situations and verbal interaction opportunities were presented with songs [17]. In one study, music therapies facilitated by a music therapist were performed at the bedside of patients. Music therapy sessions include the evaluation of symptoms and determining the goals of the session. The music was left to preference and the experiences of the patients were examined in the accompaniment of keyboard or acoustic guitar [14]. In another study, the effects of a live music session selected from the song menu by a single patient in a medical oncology/hematology unit on fatigue, energy, and pain were investigated. The live music sessions helped the patients choose the songs they wanted to hear and how they wanted the song to be played in terms of its dynamics [9]. In another study, the music preferences of the patients were discussed before the session and songs that the patients chose individually were played by the music therapists accompanied by an acoustic guitar. The fatigue, energy, and pain levels of the patients were investigated after music therapy [10].

The music interventions included live music made with acoustic guitar only in three studies [9, 10, 17], live music with a keyboard and/or acoustic guitar in one study [14], classical and/or new age music accompanied by a video in one study [16], and individualized live music in one study [36]. In all studies, certified professional music therapists assisted patients with hematological cancer [9, 10, 14, 16, 17, 36]. Music interventions were applied to patients diagnosed with hematological cancer individually in the patient room in the hospital environment [9, 14, 16, 36] or as a group in meeting rooms [10, 17].

Duration, frequency, and session of music interventions

The duration of the music interventions in all included studies varied between 20 and 45 min. The interventions were implemented twice a week in one study [16] and once a week in another study [17], as necessary [36]. Three studies did not provide clear information about the frequency of the intervention [9, 10, 14]. The interventions included 1 to 8 music sessions. In four studies, the control group received standard care [14, 16, 17, 36], and no intervention was used in two studies [9, 10].

The effectiveness of the application used in music intervention

POMS, FACIT-F, BFI, and VAS-F measurement tools were used to evaluate the included studies. It was reported in four of the studies that music interventions significantly reduced fatigue [9, 10, 16, 36]; however, no statistically significant difference was noted in two of the studies [14, 17].

Methodological quality of the included studies

All included studies were determined to have an adequate level of selection bias, and missing outcome data were considered low risk. It was stated in the studies that it was difficult to blind researchers, healthcare professionals, and patients during the implementation of the interventions. The blinding process was not performed in all studies, and the measurement risks of outcome bias were considered high [9, 10, 14, 16, 36]. None of the studies had a sample size that was large enough to conclude that music affected fatigue.

Incomplete outcome data were considered either exclusion from the analysis or patients quitting the study. The risk of attrition bias is estimated using dropout rate analysis. Studies with a dropout rate of below 20% are considered to have a low attrition bias [37]. ITT analysis was recommended in all of the randomized controlled trials. However, this analysis was not performed or reported in most of them. In three of the studies, ITT analysis and the number of patients who died were indicated [9, 10, 16]. In the other three studies, the results of ITT analysis were not reported. No risk of selection bias was identified, and it was considered low risk. Overall bias was considered high risk because the studies could not be blinded [9, 10, 14, 16, 17, 36] (Fig. 2).

Insert Fig. 2 here

Study outcomes

This meta-analysis included six randomized controlled trials examining the effects of music interventions on fatigue [9, 10, 14, 16, 17, 36]. While the meta-analysis results were analyzed (Hedge's $g = 0.03$, 95% CI = 0.10 to 0.06), the p -value was taken as $p = 0.006$, and the overall effects of music interventions on fatigue management were found to be statistically significant. Heterogeneity levels were found to be low among the included studies ($I^2 = 0$, $p = 0.77$) (Fig. 3).

Insert Fig. 3 here

Publication bias was analyzed using Egger's test, Orwin's fail-safe N, funnel plots, and Begg's test. Orwin's fail-safe N value was obtained in 2011. Accordingly, approximately 335 negative studies were needed to render the effect size of each study was included in the meta-analysis insignificant. The results of Egger's regression analysis yielded $p = 0.30$ and $t = 1.18$. The result of Begg's test yielded Kendall's tau = 0.27, $p = 0.45$, and $Z = 0.75$. When these results were evaluated, no significant bias findings were found.

The sensitivity analysis

The examination of the sensitivity analysis results of the included studies in the meta-analysis indicated that the results were stable each time one study was excluded from the analysis ($I^2 = 0\%$). Accordingly, it was determined that the sensitivities of all studies were equal and that they did not affect the overall results (Table 2).

Table 2
Sensitivity analysis results of the included studies

Excluded study	Overall effect size	P-value (heterogeneity)	I^2
Cassileth et al., 2003	2.40	0.018	0
Burns et al., 2008	2.87	0.004	0
Rosenow and Silverman, 2014	2.70	0.007	0
Bates et al., 2017	2.74	0.006	0
Herband and Silverman, 2020	2.29	0.022	0
Reimnitz and Silverman, 2020	2.25	0.024	0

Insert Table 2 here

Discussion

A review of the literature indicated that no systematic review and meta-analysis was investigated the effects of music interventions administered to patients diagnosed with hematological cancer on fatigue management. This systematic review and meta-analysis showed that music interventions applied to patients diagnosed with hematological cancer had moderate positive effects on fatigue management. In all included studies, music interventions were administered to small sample groups [9, 10, 14, 16, 17, 36]. The small sample size was found to affect the results of the meta-analysis. In four studies, music interventions were effective in reducing the severity of fatigue [9, 10, 16, 36]; however, no statistically significant difference was found in the two of them [14, 17]. According to the results of the meta-analysis, conditions, such as fatigue and the quality of life, depression, pain, and anxiety levels related to this process were examined in the included studies. Additionally, to having an important place in our daily life, music is among the enjoyable, pleasant, and peaceful human experiences. Also, music is a powerful tool that activates brain functions. Listening to music increases dopamine, endorphin, and serotonin levels, thereby facilitating signal transmission [18, 19]. In this process, it is possible to reduce the severity of fatigue by arousing positive emotions [18]. The results show that music interventions are an effective and non-invasive method that can be used as a holistic or complementary nursing intervention in reducing the severity of fatigue in patients with hematological cancer [9, 10, 16, 36].

Interventions, results, and population have an important place among the factors affecting heterogeneity results [38, 39]. As a result of this meta-analysis, the similarity of interventions, population, and sample size resulted in low heterogeneity ($I^2 = 0\%$, $p = 0.77$). Meta-regression, sub-group analyses, or moderator analyses can be performed to determine the reason for the low heterogeneity. Since the number of studies in this meta-analysis study was less than 10, these types of analyses could not be performed [40, 41]. Additionally, meta-regression could not be conducted because variables such as the stages of hematological cancers were not given clearly. The examination of the sensitivity analysis results indicated that each time a study was excluded from the analysis, the rest of the studies were effective and made contributions to reducing the severity of fatigue [9, 10, 14, 16, 17, 36].

In this meta-analysis study, the effect of music interventions and the duration, frequency, and number of sessions on the fatigue of patients diagnosed with hematological cancer was emphasized. In all studies, passive music intervention was chosen, and instrumental, classical, and new age music types were used [9, 10, 14, 16, 17, 36]. A review of the literature indicated that research into comparing the effects of music interventions on the fatigue of patients with hematological cancer was limited. When the included studies were examined, it was found that the effect of music interventions on the management of fatigue due to hematological cancer was not associated with a certain type of music. In four of the studies, it was reported that music interventions significantly reduced the severity of fatigue [9, 10, 16, 36]; however, no significant difference was found in the two of them [14, 17].

In the included studies, the duration of the music interventions varied between 20 and 45 min, and the duration of the intervention did not affect the severity of fatigue. Although the frequency of music varied in the studies, in one study it was planned as needed [36], once a week [17], or twice [16]. However, three of the studies did not present any information about the frequency of sessions [9, 10, 14].

The number of music sessions in the studies examined varied between 1 and 8. One session was applied in three studies [9, 10, 17], two sessions in one study [14], 3–7 sessions in one study [36], and eight sessions in one of them [16]. While the effect size of the study in which eight music sessions were applied was found to be larger [16], the results of studies applying a single session were also found significant [9, 10]. The number of music sessions did not affect the results according to the data of the included studies.

When the meta-analysis findings were examined, it was found that live music interventions accompanied by acoustic guitar were frequently applied and that they had a significant effect on reducing the severity of fatigue in patients with hematological cancer. When the duration of the music sessions was compared, it was determined that 20-30-min-long interventions had a significant effect. Also, the effect of music interventions applied twice a week was high. In line with the findings, it is thought that music interventions that are 20–30 min long, are applied at least twice a week in three sessions, and are accompanied by relaxing music individualized in the patient's room will help reduce the severity of fatigue in patients with hematological cancer.

In this study, live music or music accompanied by a video, which was preferred by certified professional therapists and/or patients were used. The effects of the music interventions on the severity of fatigue in patients with hematological cancer were not associated with a certain type of music. As a result of the examination of the studies, it was found that individuals did not need to be professionals to implement music interventions and that it would be enough to only receive counseling and/or education. The music interventions in all included studies were implemented by professional music therapists [9, 10, 14, 16, 17, 36]. Valid and reliable measurement tools, such as Fatigue (FACIT-F), BFI, VAS-F, and POMS, were used to evaluate the results of the studies.

In this systematic review and meta-analysis study, it should be emphasized that the choice of music interventions by the patients and/or professional therapists or the differences in the frequency, type, number of sessions, and the duration of the sessions did not make a difference in the results of the study. Due to the wide variety of music, leaving the choice to patients causes difficulties in the selection phase. In this process, it is thought that the selection of music types or songs by therapists or researchers will lead to more accurate results. Additionally, better results will be obtained in reducing the severity of fatigue by making preferences suitable for the ethnic origins and cultural structures of the patients during the music selection process.

CONSORT flowchart has an important place in the process of evaluating the quality of randomized controlled trials. This flowchart helps to conduct the randomization process properly and reduce the risk of bias. In this process, the CONSORT flowchart was used in five of the six included studies [9, 10, 14, 16, 36]. The blinding process is difficult in randomized controlled trials, in which music interventions are applied. Therefore, none of the included studies were blinded [9, 10, 14, 16, 17, 36].

The examination of the results of the included studies indicated that no inconsistent data were found. However, there were differences in the duration, frequency, number, and types of music interventions in the studies. It is thought that determining the most appropriate duration and types of music intervention will contribute more to reducing the severity of fatigue. In line with these results, planning more studies on music interventions applied to patients with hematological cancer will be important to provide diversity in symptom management.

Strengths and limitations

The strengths of the current study include the conducting of a systematic and comprehensive literature review about fatigue in patients with hematological cancer, preparation of study data in line with Cochrane criteria, and presentation of a general overview of the effect of music interventions on fatigue in patients with hematological cancer. However, this study also has some limitations, too. These limitations include the small sample size, which consisted of six studies, the inability to conduct group analyses due to differences in the duration of music sessions, and the small sample size of the included studies in the analysis. Additionally, included studies in this systematic review and meta-analysis are considered of low methodological quality. The exaggerated effect sizes observed here are due to the lack of intention to conceal the intervention, as studies fail to blind outcome evaluators and participants to the intervention. Also, the time between the music intervention and the evaluation of the fatigue measure was not reported. More randomized controlled trials with large sample groups of patients diagnosed with hematological cancer are needed to achieve a high level of evidence.

Conclusion

This systematic review and meta-analysis data synthesized evidence for the alleviation of the severity of fatigue through music interventions in patients with hematological cancer and presented data that the interventions were effective. Four of the randomized controlled trials included in the study showed that music interventions were an effective non-pharmacological method in reducing the severity of fatigue. In the studies reviewed, instrumental, classical, modern, and individualized music types were presented to patients diagnosed with hematological cancer in 20-45-min-long sessions. Additionally, in studies indicating the frequency of the intervention, music interventions were administered once or twice a week in one to eight sessions.

Nurses have important responsibilities in the fatigue process of patients with hematological cancer. In this process, they will be able to reduce the severity of patients' fatigue by using music interventions, which is an easy, practical, and effective method. As a result of the decrease in the severity of patients' fatigue, their quality of life will increase. Nurses, who have an important place among health professionals, will be able to increase patients' awareness of music interventions through counseling and education. The results of this systematic review and meta-analysis will be an important and high-evidence guide in the management of fatigue in patients with hematological cancer. To increase the number of randomized controlled studies with large samples for the application of music interventions to patients with hematological cancer and to understand whether the positive aspects of music interventions continue over time, it is recommended that patients be followed up after discharge.

Declarations

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Author contributions

All authors contributed to the study's conception and design. Material preparation, data collection, and analysis were performed by [Merve Gozde Sezgin] and [Hicran Bektas]. The first draft of the manuscript was written by [Merve Gozde Sezgin] and all authors commented on previous versions of the manuscript. All authors read and approved the final manuscript.

Ethics declarations

Ethics approval

Not applicable.

Consent to participate

Not applicable.

Consent for publication

Not applicable.

Conflict of interest

The authors declare no competing interests.

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Figures

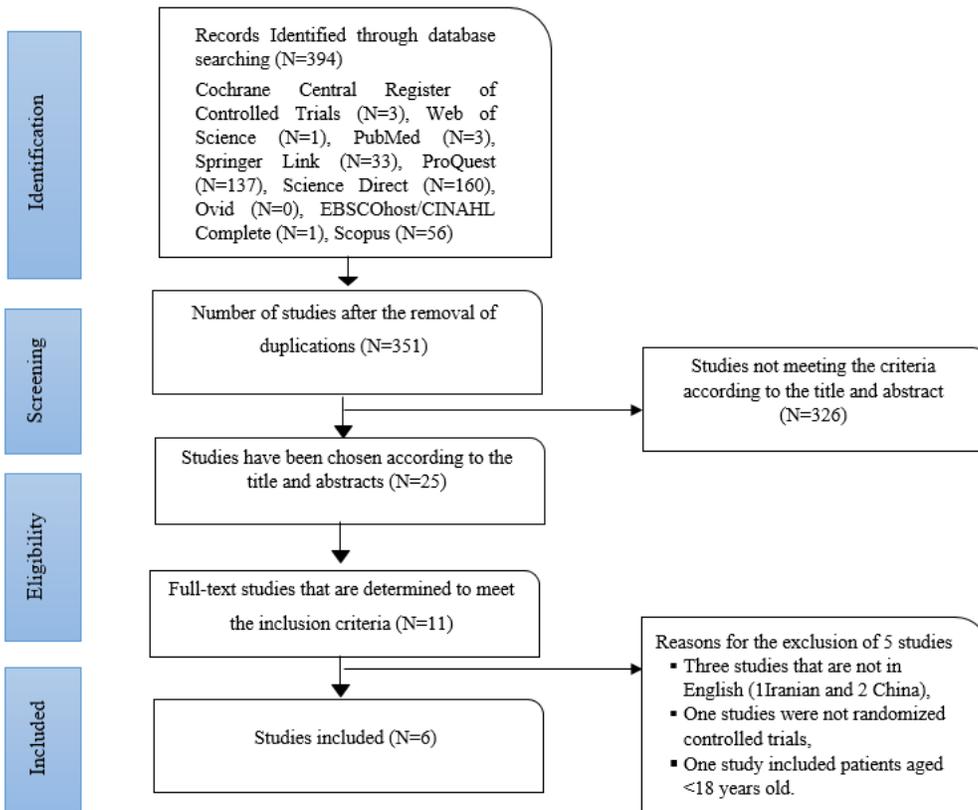


Figure 1

Flowchart of inclusion and exclusion criteria for meta-analysis and results of study screening

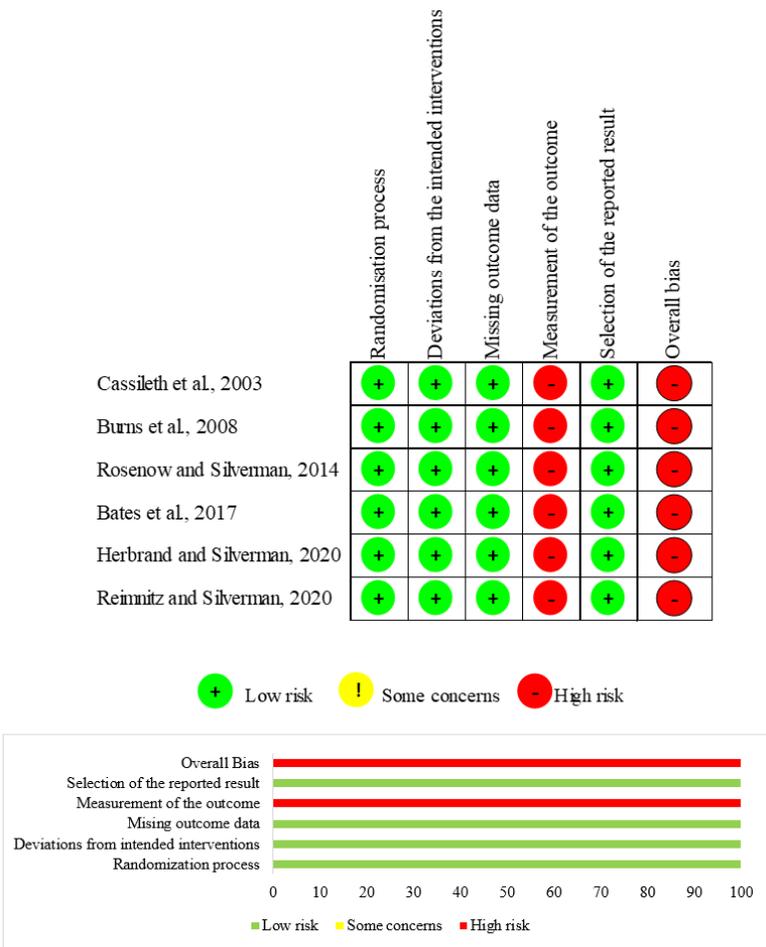


Figure 2
Risk of bias assessed using Cochrane risk of bias tool

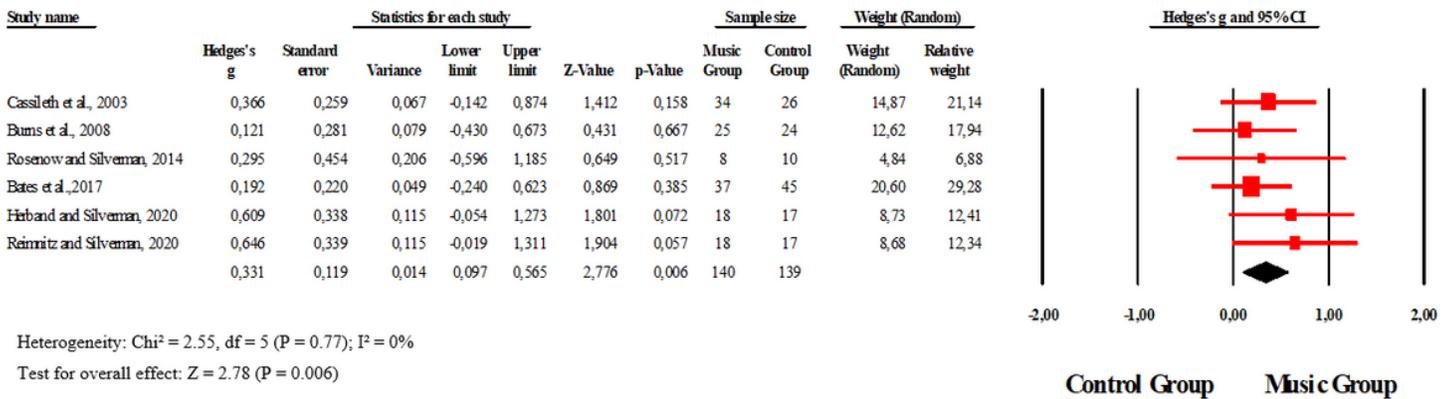


Figure 3
The results of the meta-analysis included studies

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