



The healing effect of music in cancer patients: An Invocation to Apollo

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music, cancer, music therapy, music interventions, pain management, quality of life, therapeutic results, alternative treatment, complementary treatment and combinations of these words

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Abstract

Introduction: Music interventions are frequently used for psychosocial support in addition to surgical or pharmaceutical treatment, in patients with severe diseases. During the past two decades music therapy is incorporated in the care of cancer patients, in different stages of the disease, both during diagnosis and treatment.

Aims & objectives: The aim of this study is to gain a better understanding on the psychological and physical advantages of music interventions in the treatment plans of oncological patients.

Methodology: For the completion of this literature review, online searches were performed using the search engines in databases such as PubMed, Embase and Cinahl, Google scholar, in the months of February 2010 to March 2021. From the online search carried out, 70 articles were found, 18 of them were considered as eligible sources from the title and the summary presented, while the remaining 52 articles were rejected. Of these 18 articles 8 studies were isolated, having fulfilled the criteria of being eligible for inclusion in this review. The types of the 8 studies included are: 1 Cochrane review, 1 quantitative comparative study, 1 quasi-experimental study, 3 Randomized controlled trials, 1 clinical trial and 1 pilot research study and the quality of their results range from poor to good. The total number (n) of the participants in the reviewed studies is 4350.

Conclusions: Music therapy supports treatment of cancer patients aiming at improving their emotional and physical well-being. However, since the results are mainly based on self-reporting tools (possibility of bias) further, more clinical research could be more enlightening in the future.

Introduction

According to the World Health Organization (WHO) data, cancer is one of the leading causes of death worldwide, accounting for 13% of deaths globally (7.9 million. deaths), in any given year during the past decade. The percentage of deaths due to cancer around the world is increasing continuously and it is estimated that by 2030, 12 million deaths will be recorded annually [1].

Cancer and anti-cancer treatment may cause the patient to experience physical, social and emotional (or a combination of these) changes. The application of therapeutic interventions, as an attempt to meet and manage the psychological needs of cancer patients, is backdated about 40 years. As the number of cancer patients started (and continued) to grow, a closer attention was paid to the improvement of palliative medicine to treat pain and to improve the quality of life of cancer patients [2]. During these decades, psychological support groups for cancer patients and their families were

put in place in all major oncological hospitals, given the inability to radically eliminate the symptoms in specific cases of neoplasia. At the same time, research studies, of the psychiatric and psychological effects of cancer started to materialize. During the last couple of decades, studies focused on public behaviour, and more specifically they involved the modification of habits such as smoking, poor or bad diet and lethargic lifestyle. These studies helped to raise public awareness on cancer prevention [3]. Even more, during this period, alternative and complementary interventions and therapeutic methods were included in the patients' treatment plans in order to assist with the management of intense and chronic pain experienced by cancer patients. One of those alternative and complementary therapy types is music therapy [4].

Music therapy is the clinical and empirically documented use of music by a specialized therapist who, through scientific methods, exploits the emotional, communicative and expressive properties of music in order to improve and maintain mental and physical

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health. Its aim is to use music as part of a therapeutic relationship thus promoting personal expression and development of the individual, as well as communication with other people in a music therapy group [4]. A basic assumption of music therapy is that the starting point of several diseases is the conscious or the unconscious unfavorable emotional and psychological factors, which are favorably affected by music.

Music therapy is essentially a creative form of psychotherapy with the use of music instruments or musical tools. It concerns people with psychological or psychosomatic problems, such as patients with cancer and other chronic or incurable diseases [3,4]. Music therapy is characterised as "complementary", since it is used in addition to classical medical therapeutic methods, for example, cancer patients do not stop the prescribed medication in order to focus in music therapy alone - except if this is considered necessary for the patient by the interdisciplinary team of experts who are responsible for planning their treatment. Thus, music therapy can be either supplementary or primary reinforcing the maximum therapeutic effect as intended and expected to benefit the patient [4].

The healing capabilities of sound and music are being investigated and studied throughout the centuries. The precise nature and structure of therapeutic music is still unknown, since so far during the experimental process various musical types, such as classical, light pop or jazz music have been used. Even more, since the choice of music for therapeutic use is influenced by the culture and personal taste of the patient; it gets much harder to establish a specific therapeutic pattern [4].

The first available information about the application of music as a therapeutic means came not only from Greek mythology, but also from the ancient Greek history as well as the ancient history of Egypt, China, and India. Furthermore, ancient Greek music adopted elements from the music of various Eastern cultures and incorporated them in a scientifically based theory of music, which later spread in the West [5].

Ancient Greek music came to a full peak in the 7th to the 5th BC century. During this time, the healing powers of music were developed and evolved. Therefore, there is a multitude of ancient Greeks musicians who studied and promoted the scientific and healing effects of music. The applications of music therapy are summarized mainly in the sciences of psychology, psychiatry and in various psychosomatic studies [5].

The manner by which therapeutic music was applied, seems to be receptive, energetic or mixed, although precise information is not available. It does not seem that there were categories of musical instruments according to their therapeutic effect on various diseases. It is very likely that the healing powers of music were used for the treatment of various diseases even in childhood. Specific reports, in ancient Greek texts are very limited (almost non-existing), but since people often turned to alternative and complementary treatments it is safe to assume that music was used for the treatment of specific diseases [5]. The interactions between medicine and music are fairly complex and multifolded. The practical use of music in medicine should be based on the philosophical background that includes practical applications. Rhythm and melody of music therapy are based on natural sounds, such as the

sound of wind, water, birds, the biorhythms of breathing and circulation. In order for music therapy to be effective, activation of contemplating procedures must be avoided. Their purpose is not to be dominated by the mind, but to trigger instinctual mechanisms that allow the relaxing effect of musical sounds in the brain centres of respiration and circulation [5].

The Ancient Greeks retain a prominent place in the Pantheon for Apollo, the god of the Sun, Medicine and Music, whose face crystallizes the Greek idea which supports the achievement of harmony between soul and body. This Greek god reflects the passions, the beauty, the eternal rhythm and harmony of every movement and existence, which through music is transformed into strength, health and grace [6].

His son, Asklepios uses the power of music to restore this delicate balance, while purifying chants, incantations and paeans are also used for healing purposes in Homer. When, during a hunt, Odysseus was injured by a wild boar, the sons of Autolykus stopped the bleeding with incantations (Odyssey, T 456).

According to Pythagoras, the music and the human soul are regulated by harmonies and when the psychic harmony is disturbed, diseases occur, which can be healed by music, thus restoring the harmony of the disturbed soul. Plato, as a Pythagorean, recognized the Pythagorean Harmony and admired the Pythagorean setting of intervals with numerical ratios. According to Damon, a music theorist of the 5th c. BC and teacher of Socrates and Pericles, music is powerful because it imitates the movements of the soul.

Despite the fact that the term "music" appeared for the first time in the 5th century BC in the writings of Pindar, Herodotus (Histories, F 129) and Thucydides (Histories, C 104) and the alleviating power of music against physical and psychological pain is frequently mentioned in the ancient Greek literature, the term "music therapy" is used as late as the 50s, when National Association for Music Therapy (NAMT) was founded [7].

Music therapy is an approach with a long-term and clearly identified goal. Music therapy sessions are organised by taking into account the specificities of each case and the needs of each individual patient. In music therapy sessions, which last about the same time as a psychotherapy session, i.e. 45-50 minutes at a time, a creative and expressive happening between the therapist and patient is taking place. However, contrary to the popular misunderstanding concerning music therapy, a session, in the most part, comprises of creative music playing, not listening [8].

The methods of music therapy are divided into two main categories, the interactive one, which is based on musical improvisation and the receptive one, where listening practices are used. When Music therapy improves measurable results of the human physiology, such as blood pressure, the term "Music in Medicine" is used, where the therapist's presence is not necessary, with its practice focused on the passive listening of selected music.

The therapist builds an interpersonal relationship of communication with the patient. The patient then shows health improvements by using the musical instruments available. In order to participate in a music therapy session, prior knowledge and musical skills are not necessary [9]. Thus, an interactive form of communication through sound and music is created,

without excluding verbal communication, especially in patients facing no problems in their verbal communication skills. In other words, in one session, in addition to listening to music, which is a likely part of the process, the focus is on the creative and interactive part, as well as the analysis of the psycho-synthesis of the patient through it [9].

One particular example of the music therapy approach is that of receptive music therapy [9]. In receptive music therapy sessions, only listening to music is performed, while expression of emotions and thoughts caused by the music playing are processed and analysed. This method is called "Guided Imagery and Music", it is a special skill, and sessions last for about 1.30 to 2 hours, in a twice a month frequency and it usually requires a minimum of 10 sessions to observe a therapeutic effect [9].

The International Association for the study of pain characterises pain as an unpleasant emotional experience, associated with actual or potential tissue removal. Therefore, it is only natural, that cancer patients who experience several medical interventions, most often are left with the feeling of pain and anxiety [10]. Although the results of musical therapy interventions are mainly qualitative and not quantitative, there are cases where the benefits of such sessions on patients are measurable, such as the improvement of the ratio of a person with stuttering or mobility improvement of a patient with a neurological problem, or increase in the levels of hormones associated with mood changes in cancer patients [11]. Of course, as mentioned above, music therapy interventions are focusing on long term goals, which means that a successful intervention can take a longer time to be completed compared to other more conventional psychological complementary treatments. Furthermore, their benefits are always observed in addition to any drug or surgical treatments that the patient is prescribed [12].

Various mechanisms have been proposed in the healing process of music. One of them concerns the emotional reactions associated with the limbic system, another involves the cognitive level concerning the property of music to cause thoughts, associations, images and is related to the cerebral cortex, as well as a third one, which is associated with the operation of the thalamus and is focused on the rhythm's ability to coordinate with the internal rhythms in the human body. The effect of music through rhythm refers to an instinctive function associated with a primitive ontological part of the human brain. Neuroanatomic research shows that the cochlear nucleus (cochlear nuclei), are adjacent to major autonomous cores [13], which are the breath and circulation control centres [14]. The shunt mechanism of neighbouring neurons explains the increase of breathing frequency and heart rate when hearing a fast musical tempo or the decrease of cardiac and respiratory frequency when listening to a more relaxed musical rhythm. This primary effect of music through rhythm (ie beat) occurs involuntarily regardless the sex, race or socioeconomic status of the person [13].

With this paper we have tried to summarize the recent literature on demonstrating the benefits of musical interventions in oncological patients, by highlighting studies with acceptable quality, so as to overcome statistical inaccuracies resulting from poor quality studies, which are unable to provide solid evidence towards clear clinical conclusions

Methods

For the completion of this study a critical review of articles on the advantages of music interventions in cancer patients found in the existing literature was carried out.

Inclusion criteria for the systematic review of the existing literature on the advantages of music interventions in cancer patients.

Articles that were used to complete this systematic review of the literature on the advantages of music interventions in cancer patients met the following criteria:

- The articles included were written or translated in the English language from their original version.
- Articles published by official scientific institutes such as the World Health Organization, other health establishments and sectors as hospitals, universities, health departments and research centres from around the world. Articles published at globally recognized journals (New Scientist, American Journal of Clinical Oncology, Annals of Oncology etc.) are also included in the bibliography research.
- Their dates of issue were between 2000 and 2021 and older articles that were reviewed and updated by research groups.
- Articles that examined different effects of music interventions in cancer patients.

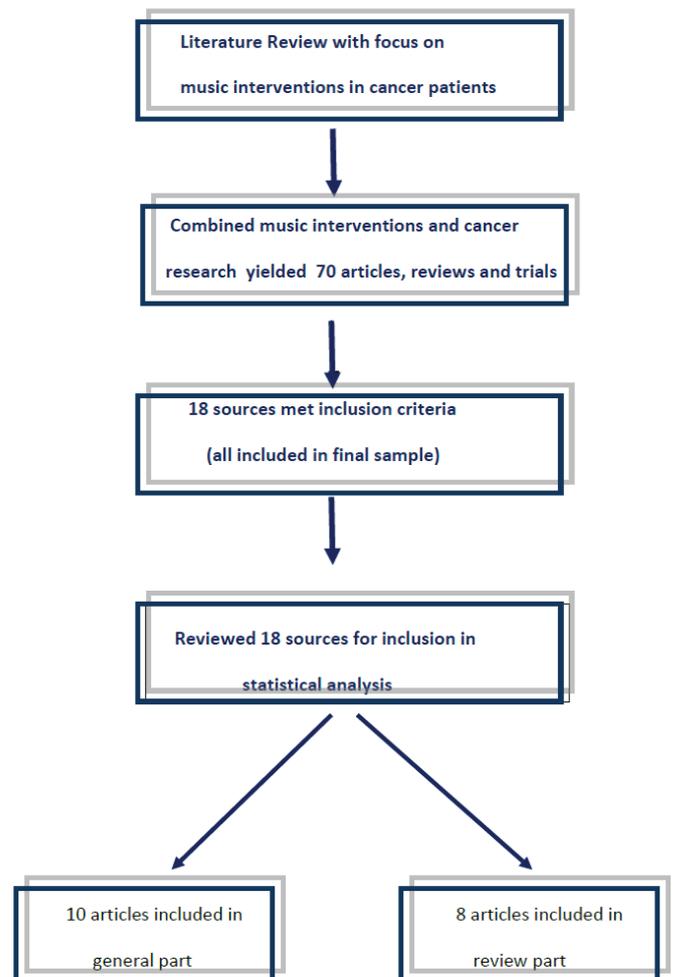


Figure 1. Research strategy diagram

Table 1. Summary of findings of the online search on psychological and physical advantages of music interventions in cancer patients

Summary of findings of the online search on psychological and physical advantages of music interventions in cancer patients					
Patient or population: cancer patient Setting: inpatient and outpatient cancer care Intervention: music interventions Comparison: standard cancer care					
Author	Title	Type of research	Number of subjects/participants	Relative effect	Quality of results
Bradt et al, 2016	Music interventions for improving psychological and physical outcomes in cancer patients	Review of 52 trials (Cochrane review)	3731	Anxiety : reduction Heart rate, respiratory rate & blood pressure: improvement fatigue : reduction quality of life: improvement	Medium
Krishnaswamy & Nair, 2016	Effect of Music Therapy on Pain and Anxiety Levels of Cancer Patients: A Pilot Study	Quantitative comparative study	14	Pain: statistical significant reduction Anxiety: no statistical significant reduction	Low
Jasemi et al, 2016	The Effects of Music Therapy on Anxiety and Depression of Cancer Patients	Quasi-experimental study	60	Anxiety & Depression levels: significant decrease	Low
Robb et al, 2014	Randomized Clinical Trial of Therapeutic Music Video Intervention for Resilience Outcomes in Adolescents/Young Adults Undergoing Hematopoietic Stem Cell Transplant: A Report from the Children's Oncology Group	Randomized controlled trial	113	Coping: significant improvement (ES=0.505; P=0.030) Social integration: significant improvement (ES=0.543; P=.028) Family environment: significant improvement (ES=0.663; P=0.008) Spiritual perspective: moderate non-significant effect sizes (E=0.450; P=0.071) Self – transcendence: moderate non-significant effect sizes (ES=0.424; P=0.088)	Moderate
Ratcliff et al, 2014	Music Therapy for Patients Who Have Undergone Hematopoietic Stem Cell Transplant	Randomized Controlled trial	90	Short-term effects on mood: improvement reported long-term effects on QOL:no association was found	Low
Lesiuk, 2016	The Development of a Mindfulness-Based Music Therapy (MBMT) Program for Women Receiving Adjuvant Chemotherapy for Breast Cancer	Pilot research study	15	Attention: improved Symptom distress: reduced	Low
Zhou et al, 2011	Effects of music therapy on depression and duration of hospital stay of breast cancer patients after radical mastectomy.	Clinical trial	120	Duration of hospital stay: decreased (significant differences) Depression: improved (significant differences)	Moderate
Bradley et al, 2015	Effects of Music Therapy on Anesthesia Requirements and Anxiety in Women Undergoing Ambulatory Breast Surgery for Cancer Diagnosis and Treatment: A Randomized Controlled Trial.	Randomized controlled Trial	207	Preoperative anxiety: improved Recovery time: no changes Anaesthesia requirements: reduction observed Satisfaction: no significant difference	Good

The strategy followed for the inclusion of articles, reviews and trials in the research part of this critical review is shown in Figure 1.

Search strategy for the review of the literature on the advantages of music interventions in cancer patients

For the completion of this literature review, online searches were performed using the search engines in databases such as PubMed, Embase and Cinahl, Google scholar, in the months between November 2020 - February 2021. Keywords used were music, cancer, music therapy, music interventions, pain management, quality of life, therapeutic results, alternative treatment, complementary treatment and combinations of these words, in order to identify and display articles that were as close as possible to the research subject.

Results of online search of literature on the advantages of music interventions in cancer patients

From the online search carried out during the systematic review of the existing literature on the psychological and physical advantages of music interventions in cancer patients, 70 articles were yielded, 18 of them were considered as eligible sources from the title and the summary presented, while the remaining 52 articles were rejected. The most common reason for exclusion of an article from any further consideration was the relativity of the article to the research subject in question (i.e. the article was referred to the results of music interventions in disable patients and not in cancer patients), the impossibility of access to the full article. Also articles included in previously carried out systematic reviews were not included in this study. The articles included in the review study are shown in table 1 below.

The purpose of the present research is to understand the psychological and physical advantages of music interventions and the inclusion of music therapy sessions in the treatment plans of cancer patients. The improvement of the quality of life in cancer patients when music interventions are implemented in their treatment programs as pain management complementary tool is also examined in this report.

Results

The types of the 8 studies included in this review are 1 Cochrane review, 1 quantitative comparative study, 1 quasi-experimental study, 3 Randomized controlled trials, 1 clinical trial and 1 pilot research study and the quality of their results range from poor to good. The total number (n) of participants in the reviewed studies is 4350.

In the study of Bradt et al, (2016) (Cochrane review of 52 trials and n=3731) the effects of music therapy regarding anxiety, depression heart rate, respiratory rate, blood pressure, fatigue and QoL of cancer patients were examined. The results yielded from their review showed statistically significant reduction of anxiety and fatigue experienced by cancer patients when music is included in their treatment plan [14]. In addition, Bradt et al reported significant decrease in heart rate and blood pressure in cancer patients that undergo music interventions as part of their treatment [13]. In the same study reported that the overall QoL of cancer patients following a complementary music therapy plan is improved [14].

Although the amount of studies reviewed by Bradt et al, as well as the size of their sample is large (n=3731), the

quality of their results is considered medium. Since some of the examined parameters (i.e. fatigue, anxiety and quality of life) are self-reported by patients and therefore there is a large window of bias, the results of this study should be interpreted with caution.

In addition, differences in factors such methods of interventions and type of intensity of treatment have led to varying results. However, the fact that in this study parameters such as heart and respiratory rate are included (all measurable parameters) the overall quality of the results of the study can be safely considered as medium. In this meta-analysis that used the full STAI-S (score range:20-80) to examine state anxiety in 1028 participants of 13 trials ,was indicated a significantly lower state of anxiety in patients who received standard care combined with music interventions than those who received standard care alone (MD:-8.54, 95% CI -12.04 to -5.05 , P<0.0001).In the sub-group analysis, the treatment benefits of music therapy versus music medicine studies were compared. The pooled effect of music therapy studies (SMD:-0.62, 95% CI:-1.01 to-0.24, P=0.001, I²=0%) was smaller than of the music medicine studies (SMD:-1.00, 95%CI -1.45 to -0.55, P<0.0001, I=93%) However, this difference was not statistically significant. (P=0.21).

The pooled estimate of the seven studies examined the effect of music plus standard care compared to standard care alone on depression indicated a moderate treatment effect of music (SMD:-0.40, 95% CI -0.74 to -0.06, P=0.02).A subgroup analysis revealed that there was no statistically significant difference between music therapy and music medicine studies for the outcome of depression (P=0.12).The pooled estimate of five trials resulted in a similar moderate effect of music interventions for mood in patients with cancer (SMD:0.47, 95% CI:-0.02 to 0.97, P=0.06). In the subgroup analysis comparing music therapy (SMD:0.37, 95% CI -0.13 to 0.87, P=0.15) with music medicine (SMD: 0.55, 95% CI -0.37 to 1.47, P=0.24) found no statistically differences between the two types of studies (P=0.73). The mean pain in the intervention group was 0.91 standard deviation less (1.46 to 0.36 less) than in the standard care group, the mean fatigue in the music intervention group was 0.38 standard deviations less (0.72 less to 0.04 less) and the mean quality of life in the music intervention group was 0.98 standard deviations more (0.36 less to 2.33 more) than in the standard care group.

The pooled estimate of the eight trials that examined the effects of music interventions on heart rate, the majority of them being music medicine studies, indicated a decrease in heart rate favouring music interventions over standard care (MD:-3.32, 95% CI -6.21 to -0.44, P=0.02). In the four trials that examined the effect of music interventions on respiratory rate, was not shown any beneficial effect (MD:-1.24, 95% CI -2.54 to 0.06, P=0.06). In the studies that assessed the impact of music interventions on blood pressure, a pooled estimate of -5.40 mmHg (95% CI -8.32 to -2.49, P=0.0003), and of -2.35 mmHg (95% CI -5.88 to 1.18) was provided for systolic blood pressure and diastolic blood pressure respectively ,favouring music interventions.

In the quantitative comparative study of Krishnaswamy & Nair (2016) (n=14) the effects of music therapy in the levels of pain and anxiety experienced by cancer patients was examined. According to their results, when music interventions are incorporated in the patient's treatment plan, pain levels demonstrate statistical significant reduction (decrease 1.43 ±

0.78, $P = 0.003$) [2]. However, the levels of anxiety measured with the use of the Hamilton Anxiety Rating Scale (HAM-A) show no statistical significant reduction (decrease 4.28 ± 0.30 , $P = 0.200$) between the two groups (study group and control group) [2].

Although the sample size of Krishnaswamy & Nair is small, their results are in accordance with similar studies and therefore it can be considered accurate. However the overall quality of their results is classified as low, solely based on their sample size and the fact that the results are based on a single application of music intervention on the study group [2].

Jasemi et al (2016) examined the impact that the implementation of music therapy has on the feelings of anxiety and depression often experienced by cancer patients. In this quasi-experimental study the sample size ($n=60$) is fairly large and the group assignments were done by random sampling [3]. The music intervention was applied for a period of 3 days and the measurements on anxiety and depression levels were carried out twice, i.e. before and after the application of the intervention [3]. The researchers present their results according to demographic parameters such as the sex and educational level of the participants. The results yielded show a significant decrease both in the feelings of anxiety ($P < 0.001$, $r = 0.42$) and depression experienced by the participants ($P = 0.003$, $r = 0.37$) [3].

Robb et al (2014) carried out a randomized clinical trial aiming to examine the therapeutic effects of music therapy in adolescent and young adult cancer patients. The sample size ($n=113$) used was gathered among 8 children's oncological hospitals and the intervention was administered during treatment with Hematopoietic Stem Cell Transplant [14]. The intervention was completed in 6 sessions over a 3-week period and in the presence of a board-certified music therapist [15]. The parameters examined were coping, social integration, family environment, spiritual perspective and self-transcendence, with measurements taken before, during and after the completion of the intervention [15]. The results presented showed an overall significant improvement in coping ($ES = 0.505$; $P = 0.030$), social integration ($ES = 0.543$; $P = 0.028$) and family environment ($ES = 0.663$; $P = 0.008$). In addition, although non-significant, a moderate effect of music intervention is also observed in the variables of spiritual perspective ($E = 0.450$; $P = 0.071$) and self-transcendence ($ES = 0.424$; $P = 0.088$) [15].

Ratcliff et al (2014) carried out a randomised controlled clinical trial aiming to examine the effects of different types of music therapy on the QoL of patients recovering from hematopoietic stem cell transplant. The sample size ($n=90$) used was fairly big and the participants were randomly separated into 2 different groups depending on the type of music used during music therapy sessions (mood matching and unstructured music based therapy) and in a 3rd group for patients receiving usual care (control group) [16]. The music therapy sessions were administered for four weekly sessions by a music therapist and the short-term effects music had on the patient's mood (using the short form of the Profile of Mood States) as well as the long-term effects music has on the quality of the patient's life were assessed (using the Functional Assessment of Cancer Therapy-General and the Bone Marrow Transplant subscale) [16]. The results showed that there was an improvement in patient's mood as far as the short term effect is concerned ($P < 0.0001$), however there was no registered

association ($P = 0.001$) between QoL of the patient and music intervention practice [16].

Lesiuk, (2016) after experiencing the Mindfulness-based Stress Reduction (MBSR) Program, carried out a pilot research study in order to cultivate, execute, and examine the impact of a music and mindfulness intervention in the improvement of attention and the reduction of distress experienced by women with breast cancer [16]. She carried out a pilot research study, where 15 female participants (sample size $n=15$) receiving adjuvant chemotherapy for breast cancer were administered four-weekly individual one-hour mindfulness-based music therapy (MBMT) sessions along with assigned homework throughout the four weeks [16]. The results yielded showed that attention ability was improved, while the symptom of distress was reduced. The author's conclusions were in accordance to the results of more generalised MBSR studies, as well as the results of previously published MBMT studies, therefore, although the small sample size used, the results of Lesiuk's study, though of fairly low quality, can be accounted and her recommendations can be taken into account when considering the effects of music therapy in the treatment of female breast cancer patients [17].

Zhou et al (2011) carried out a clinical trial involving 120 breast cancer female patients (sample size $n=120$) studying the effects of music therapy on depression and duration of hospital stay after the patients had undergone radical mastectomy. The participants were randomly divided into two equal groups (music therapy recipients and control group) and the duration of the intervention was from the first day after radical mastectomy to the third time of admission to hospital for chemotherapy [18]. The calculated results showed decrease in duration of hospital stay ($F = 39.13$, $P < 0.001$; $F = 82.09$, $P < 0.001$) and improved levels of depression ($t = -4.34$, $P < 0.001$) between the control and the experimental group, after music therapy was administered [18]. Since the measurements made and the data collected during the trial, were self-reported, their credibility could be affected by a variety of factors, such as misrepresentation of the question, emotional state of the patients, difference in personal attitude when facing a serious health issue, etc [18]. Therefore, although the sample size is statistically large, the quality of the results should be considered fairly limited. However, since the conclusions of the study are in agreement with prior and later studies on the subject, they can be accounted as of moderate quality [18].

Bradley et al (2015) in a randomised control trial tested the effects of live and recorded music therapy on the requirements of sedation and the levels of anxiety in women undergoing ambulatory breast surgery for the purposes of cancer diagnosis or treatment [19]. In their trial, 207 women were divided into 1 group where patient-selected live music was administered before the operation and therapist-selected recorded music was administered during the operation ($n=69$), a second group where patient-selected recorded music was used before the operation with therapist-selected recorded music used during the operation ($n=70$) and a control or usual care group where no music was administered before the operation and noise-cancelling earmuffs were used during the operation ($n=68$) [19]. According to their results the first 2 groups showed no statistically significant improvement in the amount of anaesthetic required during sedation when compared to the control group. However there was a significant reduction ($P < 0.001$) in preoperational anxiety scores (mean changes and

standard deviation: -30.9 [36.3], -26.8 [29.3], and 0.0 [22.7] respectively for each group) [19]. There is no worth mentioning differences in the recovery time and satisfaction levels of each of the first two groups when compared with the usual care group. However there is a small difference between the scores of participants in the live music group and the recorded music group, with the first one showing smaller recovery times than the second [19].

In overall, the results of this review, although based on a number of poor to good quality of results sources can be considered accurate. In a sample of 4350 patients (among 8 sources), it was observed that both self – reported and countable parameters that concern cancer patients are reduced or improved when therapeutic music is included in their treatment plan.

Parameters such as anxiety, fatigue, depression, pain tolerance, coping, social integration, family environment, spiritual perspective, self – transcendence, mood, quality of life, attention, symptoms of distress and satisfaction, which are self reported by the patient, although they can be bias they are still noticeably improved when compared to usual care. On the other hand, parameters such as heart rate, respiratory rate, blood pressure, duration of hospital stay, recovery time, anaesthesia requirements which are counted with the use of equipment cannot be considered as bias. These parameters also show significant improvement when pre-interventional and post-interventional levels are compared.

Discussion

The analysis of the studies shows that even today improvement of health related quality of life in oncological patients is still a challenge. Alternative and complementary therapies, such as music therapy, constitute non invasive, with minimum side effects and non complicated, low cost additions to any therapeutic program. The presence of a special therapist during music therapy is useful for guiding patients and improves the expected outcomes.

In this review study an effort was made to understand and highlight the psychosocial advantages of music therapy during diagnosis and treatment of different cancer types taken from populations of oncology patients. The review of the existing literature, although limited, shows that music therapy can be safely applied in all patients regardless their sex, age, cancer type or cancer stage.

Even though music therapy can be useful to all patients regardless their demographic profile and psychosomatic damage, the advantages of the application of music therapy sessions are more apparent in paediatric oncology patients. The application of musical therapy to oncology nursing has as its main objective the treatment of chronic pain caused by malignant neoplasms, as well as the smooth outcome of some painful treatment processes.

Several reviewed studies examine the effects on pain management during cancer treatment using music therapy as an alternative or complementary therapy method [4,13,14]. Other studies focus on the effects of music interventions on the levels of anxiety, depression and other psychosocial aspects of cancer patients [2,4,10,12,14,18-20]. There are also studies investigating the alterations in pain levels, health related quality of life, duration of hospitalisation, resilience and mood disturbances of oncology patients [8,11,13,15-19].

Medical staff working with cancer patients, in the context

of a more holistic care, using a variety of alternative treatments and more specifically music therapy, minimises the possibility that the patient will undergo a traumatic experience, especially in the case of children and adolescent oncological patients. Music therapy sessions are most effective when carried out based on the personal taste, background and cultural influence of the patient and therefore there are no specific instructions that can be followed during a music therapy session. Music therapists need to construct and adjust each therapy depending on the individual characteristics of each patient. Therefore, when the medical and nursing staff takes into account the individual characteristics of each patient and the type of painful processes the patients are subjected to, the provision of a suitable music session that can benefit the patient, could be ensured. Additionally, it is advisable for patients to feel comfortable and choose themselves any alternative form of therapy that calms them, reducing their stress levels. All of the above actions are aimed at disrupting the patients' attention from the pain or the imminent treatment process and hence reducing their perception.

The biology involved behind the physical improvements observed due to the implementation of music intervention in oncological patients is not yet fully understood. However, it is well-documented that music helps elevate the mood and spirit of human, therefore since the psychosomatic factor is one of the biggest influences in the development and progression of cancer; it is expectable that music interventions will lead to improvements of psychosocial and physical parameters in cancer patients. At the same time, disease- or treatment-related symptoms or undesirable side effects are reduced, and thus there is an observable improvement in physical parameters, as well as hospitalisation or rehospitalisation time and analgesic and sedative requirements.

Music therapy interventions focus on the beneficial effects of music on the soul, the spirit and the body of people who suffer from the disease, and they search for a physical and spiritual compensation for their unfavourable course. As cancer constitutes a condition of human deregulation, it is necessary to seek to restore or even improve the human rhythm and balance in order to deal with the undesirable effects of the disease per se and the anticancer treatment side effects. This is achievable through music and can be coordinated with the rhythm of a pulsating heart, with the melody that the human spirit shares in each of its creative expressions, and the harmony that the body instils in each and every movement.

Conclusions

With this paper we have tried to summarize the recent literature on demonstrating the benefits of musical interventions in oncological patients, by highlighting studies with acceptable quality, so as to overcome statistical inaccuracies resulting from poor quality studies, which are unable to provide solid evidence towards clear clinical conclusions.

Music has calming and relaxing effects for all people, but for cancer patients, music can help them coping with a variety of side effects such as pain, anxiety, depression and physical symptoms. The positive effects music therapy has on the emotional and psychological turmoil that cancer patients go through is the main reason that music therapy is included in the treatment plans of many cancer patients.

Music therapy can be used in all patients regardless their age, sex, origin or cancer type, as opposed to other

complementary forms of therapy. Even more, music therapy can be applied anytime during the diagnostic or treatment stages of cancer, relieving any discomfort, pain or anxiety the patient experiences. The present research shows that oncological patients were benefited from the application of music therapy [19]. In accordance to these results, previous research concluded that cancer patients during the stages of radiotherapy, post-operative recovery and in many more different stages were benefitted by the application of music therapy [20].

According to the results of our review, it is concluded that music therapy interventions when used as complementary to medical interventions or part of a therapeutic program can reduce the psychosocial effects of cancer. The results in this research are in accordance with previously published trials as well as Cochrane reviews. However since the reported results, in this and previous studies are mainly based on patient self-reports and, therefore, the possibility of preconception and misunderstandings can influence the reliability of the overall outcome, it would be useful a larger amount of quantitative studies where measurable benefits are likely to be demonstrated, to be carried out, in order the results to be confirmed. It is also necessary to carry out studies where Music Medicine will be directly compared to Music Therapy, in order to draw conclusions on the relative superiority of the one method over the other, as well as studies with differentiation between quantitative and qualitative endpoints, which will not be analyzed aggregated. However it is safe to suggest that music therapy, adjusted to each patient's individual needs, can be included in the therapeutic program of cancer patients.

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