Original Article

The Effects of Music on Cancer Patients Submitted to Chemotherapy Treatment

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Abstract

Background: Cancer incidence and mortality rates are increasing globally. Recently, the use of complementary therapies in Oncology, such as music-based interventions, has increased remarkably.
Objective: To assess the effects of recorded music on pulse and blood pressure levels, as well as on the quality of life of cancer patients, who received intravenous chemotherapy in one day.
Methodology: The study was based on a pre and post-test design without randomization. It was conducted in the Chemotherapy Day Unit of a Military Hospital in Athens, Greece. The control group (n=17), consisting of persons who did not like music, received intravenous chemotherapy, while the intervention group (n=17), those who liked music, listened to recorded music for 20 minutes during chemotherapy. An electronic sphygmomanometer, a demographic-music data questionnaire and the Greek version of SF-12v2 were used.
Results: The experimental group patients had a statistically significant increase in Mental Health Component Summary score (p=.031), Role Emotional score (p=.009) and Mental Health score (p=.038). Physical Health Component Summary score as well as pulse and blood pressure scores, were not differed significantly between groups. Non-metastatic cancer patients had a significantly larger decrement in systolic blood pressure, in comparison to metastatic cancer ones (p=.031).
Conclusions: Listening to music may improve quality of life, especially mental health of cancer patients submitted to intravenous chemotherapy. It is a simple, noninvasive and an inexpensive intervention as well. Nurses may integrate music listening in Chemotherapy Day Units as a complementary therapeutic choice.

Key words: Cancer; Chemotherapy; Music; Quality of Life; Research Design.

Background

Cancer is the second leading cause of death after heart disease in modern Western countries (International Agency for Research on Cancer, 2008). According to statistical data, cancer rates are increasing globally (World Health Organization, 2015). Cancer incidence and mortality rates for 25 cancers in Europe in 2012 revealed 3 450 000 new cases of cancer (excluding non-melanoma skin cancer) and 1 750 000 deaths respectively (Ferlay et al., 2013). In the United States of America, there were an estimated 1 685 210 new cancer cases diagnosed and 595 690 cancer deaths in 2016 (American Cancer Society, 2016). Physical illness and disability, emotional as

well as psychological problems associated with cancer, the financial burden of cancer care and the phenomenon of social exclusion, have a dramatic effect on the quality of life of cancer patients (Osoba et al., 2006).

In the last decade, the use of complementary therapies in Oncology, such us music-based interventions, has increased substantially (Bradt et al., 2011). In most cultures, music has been used as a powerful therapeutic tool for many years. Greek philosopher and mathematician Pythagoras believed in the healing properties of music, and he himself, used it in order to cure several diseases of the body and of the soul (West, 2000). Nowadays, one of the music-based interventions offered in cancer care, is Music Medicine, which is based on the use of recorded music, and gives health professionals the opportunity to provide holistic care to cancer patients (Dileo, 2006, The Joanna Briggs Institute, 2011).

Despite numerous studies conducted worldwide, the precise mechanism of function of a musical stimulus in human body, is still unclear (Lai et al., 2013). In the field of Palliative Medicine and Oncology, randomized trials suggest that music interventions are associated with improved psychological outcomes. However, the effects of music on physical health parameters, such as vital signs, are small (Zhang et al., 2012).

Until today, there has not been a study conducted in Greece, examining the effectiveness of music on cancer patients receiving chemotherapy. There have been only a few studies, regarding the effects of music on cardiac patients (Dritsas 2000, Dritsas et al. 2004, 2006). More specifically, it is the first attempt in Greece to assess the effects of recorded music on pulse and blood pressure levels, as well as on the quality of life of cancer patients who receive intravenous chemotherapy in one day.

Theoretical framework

The theoretical framework of this study combines elements of Florence Nightingale (Nightingale, 1992) and Vassiliki Lanara's writings (Lanara, 1981). In order to meet physical, psychological and spiritual needs of patients, it is suggested that nurses should provide an ideal, multi-dimensional therapeutic environment to them. In such an environment, medication is only one of the factors contributing to the healing process. In addition, external parameters such as sound and lighting conditions in the patient room (Nightingale, 1992), as well as behavioral aspects concerning health care providers such as nurse empathy towards patients (Lanara, 1981), play a vital role.

In our study music was used as a pleasant sound source and a means of emotional expression in cancer patients undergoing chemotherapy.

Methodology

The study was based on a pre and post-test design without randomization. It was conducted from 1st January to 31th May of 2016. A sample of 34 cancer patients was selected from the Chemotherapy Day Unit of a Military Hospital in Athens, Greece. This unit has a maximum capacity of 10 beds (a private room, a four-bed room and a five-bed room). On average, seven outpatients receive intravenous chemotherapy on a daily basis.

The sample was divided in the control group, patients who received only intravenous chemotherapy, as well as in the intervention group, patients who received music for 20 minutes, in addition to intravenous chemotherapy. Music intervention was repeated twice in two consecutive chemotherapy sessions. For each person who answered that liked music, another patient who did not like it, was selected. Thus, the experimental group consisted of patients who preferred music listening, while the control group was formed from those who showed not specific music preferences.

Participants were informed about all the stages of the study and gave their written consent. The study protocol was approved by the ethics committee of the hospital and of the Faculty of Nursing of the National and Kapodistrian University of Athens.

The study population consisted of 34 patients that met the following eligibility criteria: a) a cancer diagnosis, b) 18 years of age or older, c) admitted to Chemotherapy Day Unit, d) submitted to intravenous chemotherapy, e) normal state of consciousness (Glasgow Coma Scale: 15), f) willing and able to consent. Exclusion criteria were: a) hearing impairment, b) serious debilitating pathologies, c) serious mental disorders, d) cognitive deficits, f) first chemotherapy treatment and f) life expectancy less than one month. Forty patients were eligible and 34 participated in the

study. Recruitment procedure is shown in the following figure.

The experimental group patients had the opportunity to listen to preselected music for 20 minutes, during chemotherapy treatment. Based on the average daily number of outpatients, seven MP3 with earphones were bought for this purpose. Music with 60-80 beats/ min is considered to be restful (Bulfone et al., 2009). In addition, culture, familiarity and music preferences, constitute vital factors when persons with cancer choose music (Huang et al., 2010). Taking into consideration these criteria, music provided to patients included: (1) instrumental musical themes, (2) traditional music, (3) relaxing nature sounds, (4) new age vocal relaxing music, (5) classical music as well as (6) Greek orthodox church music, as shown in table 1. The intervention group patients chose one of these six types of music, according to their music preferences. During music listening, they controlled sound volume themselves. In order not to disturb control group patients who received chemotherapy in the same room, they all used their earphones.

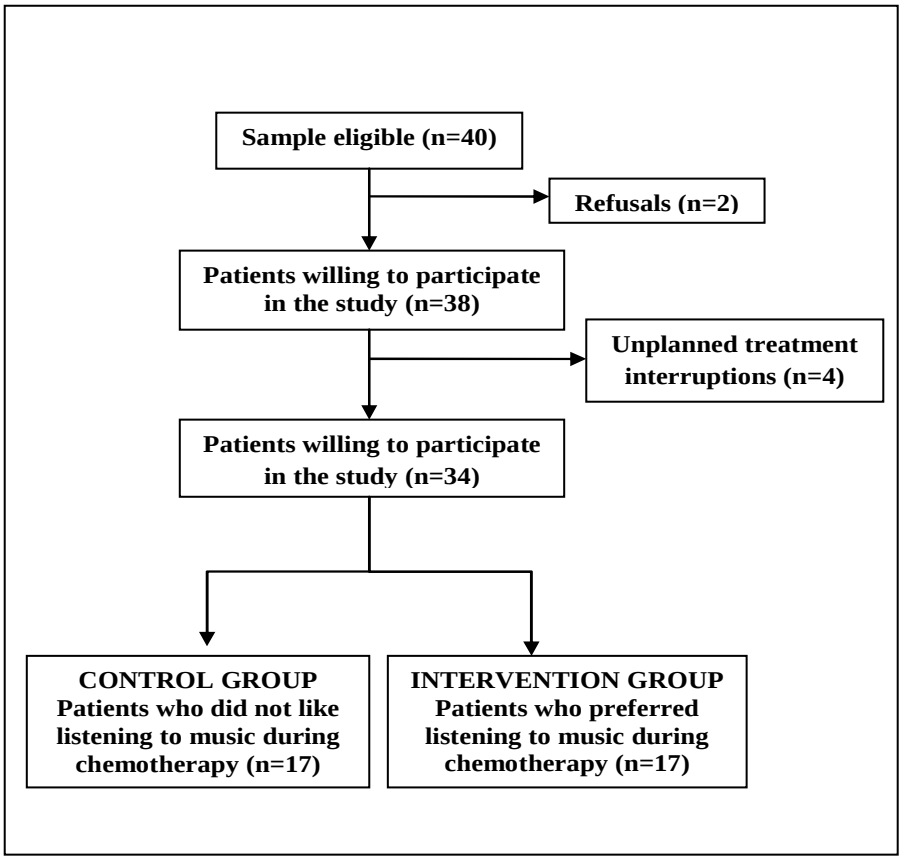

Figure. Recruitment Procedure

In our study, the independent variable was the music-based intervention, while the dependent variables were the changes on blood pressure levels, heart rate and quality of life of the participants. It is known that noninvasive blood measurements are simple and quick. In order to make cancer patients feel comfortable, an electronic sphygmomanometer was bought and used for blood pressure and pulse measurements. The rest of data was collected by using a demographic-music data questionnaire and the Greek version of Short Form 12 Health Survey Acute SF-12v2. The demographic and music data questionnaire included 8 items. The first 5 questions concerned demographic variables such as gender, age, marital status, education as well as employment status of patients. Remaining 3 questions were related to their music profile. Both groups were asked in a five-point Likert-type scale (not at all, little, somewhat, much, very much), how calm they felt when listening to their favorite music, and how important for them, was listening to music during chemotherapy treatment. The type of music each person liked most was defined according to a multiple-choice question.

As far as health-related quality of life questionnaire is concerned, the SF-12v2 was developed from the 36-item SF-36v2 Health Survey. The 12 items of SF-12v2 are used to measure 8 domains of health-related quality of life: Physical Functioning, Role-Physical, Bodily Pain, General Health, Vitality, Social Functioning, Role-Emotional and Mental Health. The first 4 domains compose Physical Health Component Summary, while the other 4 domains form Mental Health Component Summary. All the questions of SF-12v2 are given in a Likert-type scale. The SF-12v2 is available in 97 languages and English-language adaptations. Numerous studies have attested to the validity of the SF-12v2 (Ware et al., 1996). In our study, internal consistency reliability of the questionnaire was calculated by Cronbach's alpha and was found >0.7 in all scales which was considered acceptable. In addition, we used SF-12v2 Health Survey Acute (1 week recall), in order to facilitate patient-researchers communication.

In the beginning, information about the medical history of the participants was collected from their hospital record. On arrival for chemotherapy and after agreeing to participate, patients of both groups filled in the demographic-music data questionnaire and the baseline SF-12v2. Necessary explanations on how to complete the forms were made to them. Then, they were all placed in a bed to receive an intravenous pre-therapy for approximately 30 minutes. Fifteen minutes after the initiation of chemotherapy, patients' physiological parameters of blood pressure and pulse were measured (pre-test). Then, head phones were applied for the experimental group in order to listen to recorded music for 20 minutes. Meanwhile, control group was receiving only chemotherapy drugs. After completion of the music-based intervention, physiological parameters of both groups were retaken (post-test). This procedure was repeated during the second meeting with the patients, about two weeks later. After completion of two consecutive chemotherapy sessions, the participants were asked to complete SF-12v2 once again (post-test).

Categorical variables are presented as absolute (n) and relative (%) frequencies, while continuous variables are presented as mean (standard deviation) or median (range). The normality assumption of the continuous variables was examined, using Kolmogorov-Smirnov test, histograms and normal probability plots. To determine associations between categorical variables, we used chi-square test and chi-square trend test, as appropriate. Mann-Whitney test was applied to estimate the relation between a continuous variable that did not follow normal distribution and a dichotomous variable.In addition, we used repeated measures analysis of variance to examine changes on pulse, systolic and diastolic blood pressure levels, through time. In that case, we took into consideration the effect of marital status of patients, how calm they felt when listening to their favorite music, how important for them was listening to music during chemotherapy treatment, cancer type and participants' group (control or intervention group). Analysis of variance was applied at different moments in time (pre-test and post-test). In that case, compound symmetry assumption was examined, using Mauchly's test of Sphericity and Greenhouse-Geisser test.Differences were considered statistically significant with values of $p<.05$ (2-tailed test). Statistical analysis was performed with IBM SPSS 21.0 (IBM Corp. Released 2012. IBM

SPSS Statistics for Windows, Version 21.0. Armonk, NY: IBM Corp.).

Results

Sociodemographic characteristics as well as music profile of the participants are presented in Table 2 and 3 respectively. The majority of the patients were women (52.9% of each group). Median age of the intervention group subjects was 65 years, and of the control group subjects was 70 years. A larger proportion of the experimental group patients were married, in comparison to the control group (70.6% and 41.2% respectively). A larger proportion of the control group patients had a high school education, in comparison to the intervention group (41.2% and 23.5% respectively). The majority of both groups were pensioners (52.9% of the experimental group and 47.1% of the control group). There were no statistically significant between-group differences, concerning sociodemographic data.

Table 1. Type of Music and Preselected Musical Themes

Type of music	Musical themes
Romantic piano love songs from movies, instrumental music	• I will always love you (Parton) • She (Aznavour) • The godfather (Rota) • A summer place (Steiner & Discant) • Summer of '42 (Legrand) • From Russia with love (Barry) • Limelight (Chaplin) • Bilitis (Lai) • The anonymous Venetian (Cipriani) • My heart will go on (Horner)
Traditional music	• Arabic & Oriental Chill out Lounge Music
New age vocal relaxing music	• The best of Enya
Relaxing nature sounds	• Zen Garden Tranquility
Classical music	• Beethoven's 6th symphony (Pastoral)
Greek orthodox church music	• Hymns to Virgin Mary (E. Hardavellas)

Table 2. Sociodemographic Characteristics of Patients

Characteristics	Experimental group	Control group	p value
Gender			1.00[a]
Male	8 (47.1)	8 (47.1)	
Female	9 (52.9)	9 (52.9)	
Age[b]	65.0 (24.5)	70.0 (10.0)	.629[c]
Marital status			.084[a]
Single/Divorced/Widowed	5 (29.4)	10 (58.8)	
Married	12 (70.6)	7 (41.2)	
Educational level			.244[d]
Illiterate	2 (11.8)	0 (0.0)	
Elementary/Senior high school graduate	6 (35.3)	4 (23.5)	
High school graduate	4 (23.5)	7 (41.2)	
College graduate	4 (23.5)	5 (29.4)	
Postgraduate	1 (5.9)	1 (5.9)	
Employment status			.217[e]
Household	3 (17.6)	6 (35.3)	
Employee/Freelancer/Worker	2 (11.8)	0 (0.0)	
Pensioner	9 (52.9)	8 (47.1)	
Unemployed	2 (11.8)	0 (0.0)	
Employment interruption because of patient's current health status	1 (5.9)	3 (17.6)	

Values are expressed as n (%) unless otherwise is indicated
[a] x^2 test
[b] Median (range)
[c] Mann – Whitney test
[d] x^2 trend test
[e] Monte – Carlo exact test

Table 3. Music Profile of Participants

Characteristics	Experimental group	Control group	p value[a]
Music preferences			**<.001**
Listening to classical music	1 (5.9)	0 (0.0)	
Listening to instrumental music	4 (23.5)	0 (0.0)	
Listening to Greek orthodox church music	3 (17.6)	0 (0.0)	
Listening to one's favorite music, if possible (not included in MP3 musical themes)	9 (52.9)	6 (35.3)	
Not specific music preferences	0 (0.0)	11 (64.7)	
Type of music listened during 1st chemo session			**<.001**
Not listening to music during chemotherapy treatment	0 (0.0)	17 (100.0)	
Listening to instrumental music	7 (41.2)	0 (0.0)	
Listening to traditional music	2 (11.8)	0 (0.0)	
Listening to new age vocal relaxing music	2 (11.8)	0 (0.0)	
Listening to relaxing nature sounds	1 (5.9)	0 (0.0)	
Listening to Greek orthodox church music	5 (29.4)	0 (0.0)	
Type of music listened during 2nd chemo session			**<.001**
Not listening to music during chemotherapy treatment	0 (0.0)	17 (100.0)	
Listening to instrumental music	7 (41.2)	0 (0.0)	
Listening to traditional music	4 (23.5)	0 (0.0)	
Listening to new age vocal relaxing music	2 (11.8)	0 (0.0)	
Listening to relaxing nature sounds	1 (5.9)	0 (0.0)	
Listening to one's favorite music (not included in MP3 musical themes)	3 (17.6)	0 (0.0)	
How calm do you feel when listening to your favorite music?			**<.001**
Not at all/ little/somewhat	5 (29.4)	16 (94.1)	
Much/very much	12 (70.6)	1 (5.9)	
How important for you is listening to music during chemotherapy treatment?			**<.001**
Not at all/ little/somewhat	5 (29.4)	17 (100.0)	
Much/very much	12 (70.6)	0 (0.0)	

Values are expressed as n (%)
[a] Monte – Carlo exact test

Table 4. Clinical Data of Participants

Characteristics	Experimental group	Control group	p value
Cancer type			.084[a]
Non-metastatic cancer	10 (58.8)	5 (29.4)	
Metastatic cancer	7 (41.2)	12 (70.6)	
Organ/body systems affected by cancer			.271[b]
Breast	6 (35.3)	2 (11.8)	
Lung	4 (23.5)	2 (11.8)	
Colon	4 (23.5)	7 (41.2)	
Pancreas	1 (5.9)	2 (11.8)	
Peritoneum	0 (0.0)	1 (5.9)	
Stomach	1 (5.9)	0 (0.0)	
Ovaries	0 (0.0)	2 (11.8)	
Fibrosarcoma	1 (5.9)	0 (0.0)	
Neuroendocrine	0 (0.0)	1 (5.9)	
Number of chemo sessions prior to the time of study[c]	3.0 (4.0)	5.0 (8.0)	.263[d]
Other pathologies			.452[a]
None	13 (76.5)	11 (64.7)	
Hypertension controlled with medication	4 (23.5)	6 (35.3)	
Other types of therapy (except for chemotherapy)			.284[b]
None	11 (64.7)	14 (82.4)	
Surgery	5 (29.4)	1 (5.9)	
Radiotherapy	1 (5.9)	2 (11.8)	

Values are expressed as n (%) unless otherwise is indicated
[a] x^2 test
[b] Monte – Carlo exact test
[c] Median (range)
[d] Mann – Whitney test

Table 5. Relations Between Groups and Outcomes

Outcome	Experimental group	Control group	p value[a]
Pre-test mean heart rate	70.1 (9.2)	73.4 (10.3)	
Post-test mean heart rate	72.6 (10.6)	74.0 (13.7)	.826
Pre-test mean systolic blood pressure	131.3 (20.1)	127.0 (17.3)	
Post-test mean systolic blood pressure	127.6 (17.3)	128.5 (17.1)	.182
Pre-test mean diastolic blood pressure	79.5 (13.6)	73.6 (11.8)	
Post-test mean diastolic blood pressure	75.7 (11.1)	74.1 (9.9)	.565
Pre-test Physical Functioning score	46.1 (8.8)	42.8 (9.7)	
Post-test Physical Functioning score	49.3 (7.3)	44.2 (9.6)	.875
Pre-test Role-Physical score	40.7 (10.5)	45.4 (11.3)	
Post-test Role-Physical score	51.1 (8.8)	45.6 (10.7)	.718
Pre-test Bodily Pain score	49.1 (9.6)	46.8 (11.8)	
Post-test Bodily Pain score	49.1 (6.9)	47.4 (10.0)	.362
Pre-test General Health score	43.7 (12.4)	43.6 (10.6)	
Post-test General Health score	47.2 (11.1)	42.7 (10.1)	.852
Pre-test Physical Health Component Summary score	44.5 (9.1)	47.5 (9.4)	
Post-test Physical Health Component Summary score	48.2 (8.5)	48.3 (8.6)	.479
Pre-test Vitality score	52.1 (9.0)	46.2 (9.1)	
Post-test Vitality score	61.9 (7.9)	50.5 (10.2)	.191
Pre-test Social Functioning score	44.7 (10.1)	46.9 (12.2)	
Post-test Social Functioning score	51.2 (8.0)	49.0 (8.9)	.786
Pre-test Role-Emotional score	45.3 (12.7)	35.9 (15.0)	
Post-test Role-Emotional score	51.7 (5.3)	34.2 (14.8)	**.009**
Pre-test Mental Health score	48.3 (8.0)	40.2 (13.9)	
Post-test Mental Health score	54.2 (8.0)	41.5 (13.4)	**.038**
Pre-test Mental Health Component Summary score	48.5 (11.7)	40.0 (14.6)	
Post-test Mental Health Component Summary score	56.1 (8.2)	41.1 (15.5)	**.031**

Values are expressed as mean (standard deviation) [a] repeated measures analysis of variance

As regards music data of the study population, the music type listened most during the two consecutive chemotherapy sessions, was instrumental music (41.2%). The intervention group patients felt more calm when listening to their favorite music, in comparison to the control group patients (p<.001). Furthermore, listening to music during chemotherapy treatment, was more important for them, in comparison to the other group's patients (p<.001).As far as clinical data of the participants are concerned, they are presented in Table 4. A statistically significant difference was not observed between study groups. The majority of the experimental group subjects

suffered from breast cancer (35.3%), while the control group accumulated a greater percentage of colon cancer (41.2%). A larger proportion of the control group patients suffered from metastatic cancer, in comparison to the intervention group (70.6% and 41.2% respectively).

Physiological parameters' changes

As far as primary outcomes are concerned, there was a small increase in control group and experimental group patients' mean heart rate on the post-test (p=.826). Similar results were revealed as regards blood pressure levels. In particular, a slight increment was observed in control group subjects' mean systolic and diastolic blood pressure. Instead, a moderate decrease was noted in intervention group participants' blood pressure (p=.182 for between-groups systolic blood pressure changes and p=.565 for diastolic blood pressure changes). According to repeated measures analysis of variance, there were no statistically significant relations between physiological parameters and marital status of patients, how calm they felt when listening to their favorite music, how important for them was listening to music during chemotherapy treatment, cancer type and participants' group, except a statistically significant relation observed between systolic blood pressure and cancer type (p=.031). More specifically, non-metastatic cancer patients had a significantly larger decrement in systolic blood pressure, in comparison to those who suffered from metastatic cancer.

Health-related quality of life's changes

As far as secondary outcomes are concerned, Physical Health Component Summary (PCS) score was not altered significantly in both groups (p=.479). According to repeated measures analysis of variance, there were no statistically significant relations between Physical Health Component Summary score and marital status of patients, how calm they felt when listening to their favorite music, how important for them was listening to music during chemotherapy treatment, cancer type and participants' group.

On the contrary, there was a statistically significant relation between Mental Health Component Summary (MCS) score and participants' group (p=.031). In particular, the experimental group patients had a significantly higher increase in Mental Health Component Summary average score, in comparison to the control group patients. In addition, patients who answered that felt calm/very calm when listening to their favorite music, had a significantly larger increment in Mental Health Component Summary average score, in comparison to those who got a little calm or did not feel calm at all, when listening to music (p=.025).

As regards the four scales of PCS separately, there were no statistically significant post-test differences in Physical Functioning, Role-Physical and Bodily-Pain average scores between groups, neither repeated measures analysis of variance revealed any statistically significant relation. However, intervention group patients' Role-Physical average score increased remarkably on the post-test, while control group's respective score was slightly raised (p=.718). Listening to music did not affect patients' Bodily-Pain average score. Another considerable finding is that married patients had a significantly larger increment in General Health average score, in comparison to single/divorced/widowed ones (p=.035).

Concerning the four scales of MCS, repeated measures analysis of variance demonstrated several statistically significant relations. Firstly, patients who answered that felt calm/very calm when listening to their favorite music, had a significantly higher increase in Vitality average score, in comparison to those who got a little calm or did not feel calm at all, when listening to music (p=.023). According to post-test between-group differences on Vitality average scores, the control group had a moderate increase, while the experimental group had a larger increment (p=.191). Patients who answered that music intervention during chemotherapy treatment was important/very important for them, had a significantly greater increase in Social Functioning average score, in comparison to those who answered that listening to music was of little importance for them or was not important at all (p=.032).

Moreover, the intervention group had a significantly larger increment in Mental Health average score as well as in Role-Emotional average score, in comparison to the control group

(p=.038 and p=.009 respectively). Last but not least, patients who answered that felt calm/very calm when listening to their favorite music, had a significantly higher increase in Role-Emotional average score, in comparison to those who got a little calm or did not feel calm at all, when listening to music (p=.019). Between-group relations as well as outcome comparisons are presented in Table 5.

Discussion

We found that listening to recorded music while receiving intravenous chemotherapy, was related with increased Mental Health Component Summary score on cancer patients (p=.031). This relation is confirmed by two other studies conducted in Florida and in Taiwan. Particularly, Ferrer (2007) and Lin et al. (2010), based on a randomized controlled trial, examined the effects of live and recorded music respectively, on anxiety levels of cancer patients submitted to one chemotherapy session. Anxiety assessment tools used in both cases was the Visual Analogue Scale, while Lin et al. used the Chinese version of the State-Trait Anxiety Inventory too. It was noted that intervention group had a statistically significant reduction in anxiety levels, a finding that reflects quality of life improvement in general.In contradiction to physiological parameters, quality of life has not been examined extensively as far as music effects are concerned (Archie et al., 2013). In our study, we used SF-12v2 in two consecutive chemotherapy sessions and we observed that listening to music was related with increased Role-Emotional and Mental Health score (p=.009 and p=.038 respectively). That may lead to the conclusion that music constitutes a useful tool for coping with negative feelings (Nilsson, 2008). Patients who felt calm/very calm when listening to their favorite music, had a statistically significant increase on Vitality score (p=.023). It is obvious that music makes people feel more energetic, on condition that they are fond of it. Taking into account the moderate increase observed on control group's Vitality score as well, we may suppose that patients who received chemotherapy plus music in the same room with the control group participants, influenced the mood of the latter positively.Participants who answered that listening to music during chemotherapy was important/very important for them, had a statistically significant increase on Social Functioning score (p=.032). Observing experimental patients' behavior, we noted that they discussed about their music preferences, using music as a means of socialization.

Furthermore, we found that listening to music did not affect pain levels. Instead, it raised intervention group's Role Physical mean score by 10 points approximately. It is known that music distracts patients' attention (Good et al., 2001), thus, it may motivate them to act in everyday life, despite their physical discomfort. We also found that married persons had a statistically significant increase in General Health score (p=.035). Based on behavioral observation once again, we noted that patients who were accompanied by their partner, showed strong willingness to adopt new practices and change their life for the better. As regards physiological parameter values, there were no statistically significant differences. This finding is in agreement with Lin et al. and Ferrer's results. However, Silva et al. (2014) conducted a cross-sectional study in Brazil and found a significant decrease on experimental patients' heart rate. Perhaps, this finding was due to small study population. Nevertheless, Silva's research offers detailed information on medication provided to each participant.

Another finding was that non-metastatic cancer patients had a statistically significant reduction in systolic blood pressure (p=.031). It is known that homeostatic feedback mechanisms are associated with carcinogenesis (Weinstein, 2000). Moreover, it has been found that the local renin-angiotensin system (RAS) of several organs, plays a vital role in tumorigenesis and metastasis (Deshayes & Nahmias, 2005). Perhaps, this role in combination with the systemic effects of RAS on cardiovascular homeostasis (Crowley & Coffman, 2012), may explain the different way in which systolic blood pressure changes were expressed on metastatic cancer patients and non-metastatic cancer ones.

Limitations

There were also limitations in our study. Firstly, the study population was small and non randomization method was used. Secondly, the participants did not suffer from the same type and stage of cancer. In addition, each of them received a different type of medication. Furthermore,

musical themes provided to experimental group patients, did not meet their music preferences in all cases. As regards music effects on human body, we did not examine them on a long term basis.

Conclusions

Despite the limitations, this study constitutes a first attempt in Greece that may stimulate scientific interest in improving nursing services offered in chemotherapy units, using music. Listening to music during chemotherapy treatment may ameliorate cancer patients' quality of life. From a psychological standpoint, music can reinforce patients' vitality, improve their mood and help them dealing with their negative emotions.

Taking into account that it is harmless, does not cost and may be implemented easily, it constitutes a holistic approach to cancer therapy that may benefit both primary and secondary health care. In public health sector, cancer patients' quality of life improvement represents a decrement on health care expenditures. Future researches, especially randomized controlled trials and meta-analyses, should be conducted in order to enhance evidence-based clinical practice.

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