The effect of therapeutic music on anxiety in children with acute lymphoblastic leukaemia

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Cancer and its treatment are generally considered to be stressful. One of the important approaches used to reduce the anxiety is therapeutic music. The purpose of this study was to examine the effects of therapeutic music on anxiety in children with ALL. This study was conducted as single-grouped pre-test, post-test quasi-experimental design at the paediatric oncology unit of a university hospital in Turkey between February 2010 and June 2010. 28 children were selected by using convenience sampling. In order to obtain the study data, the VAS was used. The duration of the therapeutic music sessions ranged from 15 to 30 minutes during the chemotherapy procedure in the child’s room. At the beginning and end of therapeutic music session, the child completed 0-10 point VAS. In this study, it was determined that anxiety of post-test measures decreased to pre-test measures for all age groups and the difference between them was found as statistically very significant (p<0.05). P<0.05 is a standard level of significance. The findings of this study, which are consistent with previous reports, support the opinion that therapeutic music may have a positive effect on hospitalised paediatric oncology patients.

Keywords: Acute Lymphoblastic Leukaemia, Anxiety, Child, Music, Nursing


Cancer and its treatment are generally considered to be stressful. Cancer patients and their families are experiencing physical and psychological distress. Upon a cancer diagnosis, children endure unfamiliar and possibly frightening hospital environments. For this reason, the children with cancer may feel anxious, embarrassed, and isolated.

Complementary therapies have been increasingly utilised by cancer patients to reduce the complications associated with disease. In the literature, results of many studies have showed that massage, reflexology, therapeutic music, acupuncture, and meditation in the cancer patients can help reducing adverse symptoms such as pain, nausea, anxiety, and depression. Listening to music is one of several non-pharmacological methods to relieve pain and anxiety in both adults and children. As the effect of music on human beings is multi-dimensional, the music is used for treatment and has become an important part of medicine and health care in recent years.

75% of patients with cancer suffer from non-pathological anxiety. Therefore, it is important to provide interventions, which may be able to reduce the anxiety of cancer patients. Therapeutic music is an effective intervention for minimising the anxiety of cancer patients in palliative care. Cancer patients often use the music as a non-pharmacological therapy to reduce stress, improve mood, and decrease pain. Music may also offer potent physiological and psychological benefits for very sick children. Therapeutic music has been reported in several studies to be effective in reducing anxiety in children undergoing medical and dental procedures. The studies conducted on children with cancer determined that the therapeutic music was successful as a non-pharmacological anxiolytic.

The most important duty of health care professionals is to help children and their families to cope with many discomforts arising during hospitalisation based on diagnosis and treatment. Music applications, which are simple and easy, are very important in terms of effectiveness of treatment as well as quality of care.
Aim
The aim of this study is to examine the effects of therapeutic music in children with ALL on anxiety undergoing chemotherapy treatment.

Hypothesis of the research
Hypothesis: Therapeutic music will reduce the anxiety levels of children with ALL undergoing chemotherapy treatment.

Methodology
Study design
We conducted the study as single-grouped pre-test, post-test quasi-experimental design at the paediatric oncology unit of a university hospital in Turkey between February 2010 and June 2010. 28 children were included in this study.

Setting and samples
All children, who were diagnosed with ALL and hospitalised to the paediatric oncology clinic for treatment, constituted the population of the study. The sample selection method was not used in this study. During the study, all children, who were registered with a primary diagnosis of ALL in the paediatric oncology clinic, were appropriate for the criteria of the study and agreed to participate in the study – nobody refused to participate in -, were incorporated in the study. The eligibility criteria were: (1) being on a second session of chemotherapy, (2) being aged between 5 and 15 years, (3) being able to read and understand Turkish for children and their mothers, (4) not having any problem with hearing, and (5) having no history of psychiatric illness, (6) not having sedation therapy, and (7) receiving 30 to 90-minute sessions of intravenous chemotherapy infusion, were administered for the same doses of the same chemotherapy agents. Children’s age, gender, and treatment information were extracted from the medical records and verified by the paediatric oncologist.

Measurements
A VAS was used to assess the level of anxiety. VAS is considered to be easily understandable and practicable for children who are five years old and older. At the beginning and end of the therapeutic music, a VAS scale, which has a 10-cm line with anchors, was used. The child, who was five years old or older, reported the VAS for itself. The VAS ranged from 0 to 10, where 0 represented no anxiety and 10 represented the worst possible anxiety. The researcher asked the children to point out to a place on the line for their anxiety level. The researcher evaluated the pointed place as a number from 0 to 10. Mother of the children was not asked to make any assessment for anxiety. Supports of the mothers were received regarding asking to tell their children only how to make VAS assessment. Training was given to mothers related to VAS and how it is evaluated. In order to determine anxiety, mothers and children were asked the following questions: ‘Do you feel tense yourself?’/’Is your child tense?’ and ‘Do you feel restless because of the procedure?’/’Is your child restless due to the procedure?’ and ‘If you think your child is in anxiety, assess your child’s anxiety by giving a number between 0 and 10’/’If you have anxiety, please say a number between 0 and 10 to assess it’ (Fig. 1).

Therapeutic music intervention
The therapeutic music session was given in the child’s room. A VAS determined the evaluative dimension of anxiety. At the beginning and end of the therapeutic music session, the child completed the 0-10 point VAS.

The music used for the intervention was 15 - 30 minutes of the Four Seasons. The children chose songs from The Four Seasons and they would like to listen to through earphones from an iPod, which is a portable music player with earphones. This music was selected because, given the differences in musical preferences among children, we wished to use a standard intervention that would be equally unfamiliar to all children; in fact, no child or their mother reported having heard the CD previously. The volume was adjusted as desired by the child.

Data analysis
Data analyses were conducted by using PASW Statistics v. 18 (SPSS Inc., Chicago, IL, USA/IBM, Armonk, NY, USA). Demographic characteristics were presented as percentage and mean. To test the effect of music on changes in VAS score, only data

![Visual Analog scale](Fig. 1)
obtained from children with both pre- and post-VAS scores were used. Pre- and post-change scores were calculated. The Wilcoxon Sign test was used to compare the difference between intra group measures in terms of both pre-test mean and post-test mean. Mann-Whitney U test was used to compare the difference between the age groups in terms of pre-test mean and post-test mean. The confidence interval was 95%; and (p<0.05) was considered to be statistically significant.

**Ethical considerations**

Permission was obtained from the department of paediatrics haematology-oncology clinic of a university hospital in Turkey and informed consent was obtained from each participant. Informed consent was obtained either verbally or in writing from 28 children and their mothers. While the children gave verbal consent, their mothers’ gave written consent. Prior to this study, all mothers and children were informed about the purpose of the study and stage. The researchers explained the study, informed the mothers about the rights of the children and obtained their signatures on consent forms.

**Results**

Complete data was available for 28 children. Between the dates of the study, all children, who were treated in the clinic and supplied the inclusion criteria, were included in this study. There was no child who had incomplete data or dropped out.

Table 1 illustrates the demographic characteristics of the children. There were 10 girls and 18 boys, aged between 5 and 15 yrs (mean 8.67±2.63). Of the children, 64.3% were male, and 78.6% were between 5-10 yrs. The children usually came from the middle socioeconomic strata. The economic strata of the children was described as income greater than expenditure (high), income equal to expenditure (middle), or income less than expenditure (lower) by using a self-report given by the children and their mothers.

Table 2 illustrates the mean and standard deviation of the pre and post-test measurements for anxiety. While analysis of Mann-Whitney U was used to test all age groups’ differences in the inter-group, analysis of Wilcoxon was used to test differences between pre-test and post-test mean in the intra-group. In this study, it was found that anxiety of post-test measures decreased compared to pre-test measures for all age groups and the difference was very statistically significant (p<0.05). The anxiety pre-test mean of 5-10 year-old group (5.73±2.43) decreased on post-test mean (5.04±2.24) and the difference between groups was very statistically significant (p<0.001). The anxiety pre-test total means of 11-15 year-old group children was 5.33±2.06, the post-test total mean obtained from the inventory (4.17±1.47) decreased, and the difference between groups being statistically significant (p<0.05).

We calculated the mean delta change between pre-test and post-test after total mean scores for anxiety in all age groups. Table 2 illustrates the comparison of the mean delta change between all age groups and shows significant difference between mean delta changes for anxiety of all age groups (p<0.05).

**Discussion**

Cancer treatment caused anxiety and depressed mood associated with medical procedures such as
bone marrow aspiration, lumbar punctures, and chemotherapy. It is therefore important to reduce these problems in the care of children with cancer. Distraction appears to be an easy and effective method to reduce anxiety in children undergoing procedures. Therapeutic music has shown beneficial results as a distraction in other clinical trials. Listening to music is one of several non-pharmacological methods to relieve anxiety in children. In this study, therapeutic music was used as the only treatment for anxiety relief in children with cancer who were undergoing a chemotherapy procedure. This study showed that therapeutic music helped the children to endure the amount of perceived anxiety. Kemper et al., (2008) reported in their studies that therapeutic music provided significant improvement relaxation, well-being, and low level of distress in children with cancer. Klassen et al., (2008) reported that music is effective in reducing anxiety and pain in children undergoing medical and dental procedures. Music can be considered to be an adjunctive therapy in clinical situations that produce pain or anxiety. In the study conducted by Nguyen et al., (2010), their results showed that music 10 minutes before the LP reduced the preprocedural anxiety level. In their studies, Sahler et al., (2003) found out that therapeutic music intervention reduced anxiety levels in patients who underwent bone marrow transplantation. The findings of this study, which were consistent with reports of the study of Balan et al. (2009), support the hypothesis that therapeutic music may have a positive effect on hospitalised paediatric oncology patients.

Therapeutic music has good effect to decrease pain and anxiety in children both during painful procedures and during general treatment for cancer. Many types of distraction techniques including hypnosis, mind–body, listening to music, and virtual reality may help decreasing pain and anxiety and thereby suffering in children undergoing procedures that are part of cancer treatment. Many of these techniques are easy to learn and all are within the scope of nursing practice. Nurses may use these techniques with children and teach parents them to support children during painful procedures and cancer treatment.

The use of therapeutic music offers physiological, and psychosocial benefits to cancer patients and their family members. Providing music in a hospital ward and in waiting areas can create a positive effect for children and their family members. This study’s findings suggested a general improvement in the child’s anxiety after therapeutic music.

The mean post-test anxiety scores decreased in both 2 groups. When 2 age groups were compared, difference between mean scores of pre test and post test at 11-15 age group was slightly higher. Since the senses and responses of children at 11-15 age group were better, their post test anxiety level may decrease more compared to the other group.

In this study, participants constituted the small sample size and this is a limitation of the study. Future studies need to be conducted with larger sample groups. In this study, only VAS was used. Future studies on paediatric oncology patients would benefit from using both subjective and objective measures of anxiety.

Implications for nursing and health policy
The most important duty of health care professionals is to help children and their families to cope with many discomforts arising during hospitalisation based on diagnosis and treatment. Therapeutic music is the use of music by healthcare professionals to promote healing and enhance quality of life for their patients. Presence, a nursing intervention, is a component essential to the holistic care. The music intervention with nursing presence provided a more friendly music experience to the listeners. This study revealed the significance of nursing presence and how this might be delivered through music intervention.

Conclusion
The “Four Season” album was selected by researchers and children selected the songs to listen from this album. The children listened to music through earphones thus it was ensured that the child was not affected by surrounding sounds. In the next stage, new studies evaluating the efficiency of different music on children with different health problems will be carried out in larger groups.

Younger children have been reported to be at greater risk of developing emotional and behavioural problems during and following hospitalisation, which is likely due to their limited understanding of illness and medical procedures. The suggestions that young children are receptive to therapeutic music and that their mood during hospitalisation for ALL treatment seems to improve with this intervention provide reasons for optimism for the care of children with ALL.
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