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ORIGINAL ARTICLE

# The Effect of Art-based Mandala on Mental Health Among Patients Transplanting Bone Marrow: A Randomized Controlled Study

## Kemik İliği Nakli Hastalarında Sanat Temelli Mandalanın Mental Sağlığa Etkisi: Randomize Kontrollü Çalışma

Ayşenur Çetin Üçeriz[1,2], Rukiye Pınar Bölüktaş[3]

[1]Department of Nursing, Haliç University Faculty of Health Sciences, İstanbul, Turkey
[2]Department of Nursing, Koç University School of Nursing, Institute of Health Sciences, İstanbul, Turkey
[3]Department of Nursing, İstanbul Sabahattin Zaim University Faculty of Health Sciences, İstanbul, Turkey

**Abstract**

**Objective:** This study aimed to investigate the effect of nurse-led art-based mandala practice on psychosocial problems in patients undergoing bone marrow transplantation.

**Method:** This parallel-group randomized controlled study with repeated measurements was conducted in a university hospital's bone marrow transplant unit. A total of 46 patients hospitalized for bone marrow transplant treatment were randomly assigned to the intervention and control groups. The intervention group was made to apply an art-based mandala under the leadership of a nurse for 7 sessions. The control group received only routine treatment. Patients in both groups completed the Beck hopelessness scale, distress thermometer, psychological well-being scale and state-trait anxiety questionnaires before, during, and after transplantation. The data were analyzed using the SPSS IBM 27.0 package data program.

**Results:** During and after bone marrow transplantation, the intervention group experienced a noteworthy reduction in stress, anxiety, and hopelessness, as well as a considerable improvement in psychological well-being compared with the control group. The difference in mean scores between the groups over time was statistically significant.

**Conclusion:** Nurse-led art-based mandala practice is an effective, safe, and well-received method for addressing the psychosocial challenges of patients undergoing bone marrow transplantation. This nursing intervention is reliable and impactful for managing psychosocial problems during the bone marrow transplantation process.

**Keywords:** Art-based mandala, bone marrow transplantation, mental health, nurse-led care

**Öz**

**Amaç:** Bu çalışmada, kemik iliği nakil hastalarında hemşire liderliğindeki sanat temelli mandala uygulamasının psikososyal sorunlar üzerine etkisinin incelenmesi amaçlanmıştır.

**Yöntem:** Çalışma, bir üniversite hastanesinin kemik iliği nakil ünitesinde tekrarlı ölçümler tasarımına sahip paralel grup randomize kontrollü bir çalışma olarak gerçekleştirildi. Kemik iliği nakil tedavisi amacıyla hastanede yatan 46 hasta müdahale ve kontrol gruplarına rastgele atandı. Müdahale grubuna 7 seans olacak şekilde hemşire liderliğinde sanat temelli mandala uygulaması yaptırıldı. Kontrol grubuna sadece rutin tedavi uygulandı. Her iki gruptaki hastalar nakil öncesi, günü ve sonrası Beck umutsuzluk ölçeği, distres termometresi, psikolojik iyi oluş ölçeği ve süreksiz-sürekli kaygı envanteri anketlerini tamamladılar. Veriler SPSS IBM 27.0 paket veri programı ile analiz edildi.

**Bulgular:** Nakil günü ve sonrası müdahale grubundaki kemik iliği nakil hastalarının kontrol grubundaki hastalara kıyasla stres, kaygı ve umutsuzluk puan ortalamalarında anlamlı bir azalma ve psikolojik iyi oluş ortalama puanlarında ise başlangıç düzeyine göre anlamlı bir artış vardı. Grupların ortalama puanlarındaki değişimde zaman içinde istatistiksel olarak anlamlı bir fark vardı.

**Corresponding Author:**
Ayşenur Çetin Üçeriz, aysenurcetinuceriz@gmail.com

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**Sonuç:** Hemşire liderliğindeki sanat temelli mandala uygulaması, kemik iliği nakil sürecinde hastaların psikososyal sorunlarını yönetmek için etkili, güvenli ve kabul edilebilir bir yöntemdir. Hemşire liderliğindeki sanat temelli mandala uygulamasının, kemik iliği nakil sürecinde yer alan hastaların psikososyal sorunlarının yönetilmesi için güvenilir ve etkili bir hemşirelik müdahalesi olarak kullanılabilir.

**Anahtar Kelimeler:** Sanat temelli mandala, kemik iliği nakli, mental sağlık, hemşire liderliğinde bakım

## Introduction

Bone marrow transplantation is a frequently preferred treatment method in patients with hematological malignancies and bone marrow failure (1,2). In the bone marrow transplantation process, psychosocial problems can be seen in patients due to the success rate of the treatment method, whether a suitable donor can be found for allogeneic transplants, uncertainty, social isolation, and physical problems related to the process (3). Psychosocial difficulties accompanying bone marrow transplantation are evaluated by the relevant literature in the context of quality of life and psychopathological research, and psychosocial problems such as anxiety, depression, anxiety, stress, and hopelessness are frequently addressed (4).

The American Art Therapy Association defines the purpose of visual art-based practices as helping individuals develop interpersonal skills to solve their problems and conflicts, direct behavior, reduce stress, increase self-esteem and individual awareness, and realize self-realization. The relevant literature also reports that art-based practices are an effective therapy method in protecting and improving the psychological well-being of individuals as a journey to the inner world of individuals (5,6). Mandala, which is among the art-based practices, means center or circle in Sanskrit and is a kind of meditation therapy method that relaxes the human mind, allows the individual to psychologically evaluate the conditions he is in, and improves negative mood (6). When the literature is examined, it is stated that supporting the treatment and care of individuals with mandala, which is among the art-based practices, positively affects the adaptation process, enables them to live a meaningful life, increases their insights about cancer and their life, their acceptance of the disease and their participation in treatment are better, their emotional expressions are more effective, and their spiritual and mental well-being is positively affected (7-9).

**Main Points**

- It is important to support the mental health of bone marrow transplant recipients.
- Mandala is an art-based practice that can be used to support mental health.
- It has been reported that the mandala supports mental health, reduces stress, depression, anxiety, and increases psychological well-being.
- Mandala positively contributes to the healing process of bone marrow transplant recipients by helping them express themselves and manage their emotions.
- It is recommended that bone marrow transplant nurses use the mandala, which is one of the art-based practices, in the treatment and care process.

Bone marrow transplantation involves not only physical but also emotional and psychological challenges (1,3). However, clinical practices often neglect the mental health needs of these patients. Art-based interventions, such as mandalas, can help patients express emotions, understand their illness, and actively participate in treatment, ultimately improving their well-being and quality of life (4). In the bone marrow transplantation process, no study has focused on the nurse-led art-based mandala application and addressed the psychosocial problems of patients. Therefore, this study aimed to determine the effectiveness of nurse-led art-based mandala practice for the treatment and care of psychosocial problems in bone marrow transplant recipients.

### Study Question

Is a nurse-led, art-based mandala intervention effective in reducing distress, hopelessness, and trait anxiety and improving psychological well-being in bone marrow transplant recipients?

### Research Hypothesis

$H_0$. Nurse-led, art-based mandala intervention does not affect distress, hopelessness, trait anxiety, or psychological well-being in bone marrow transplant recipients.

$H_1$. Nurse-led art-based mandala intervention reduces distress after bone marrow transplantation.

$H_2$. Nurse-led art-based mandala intervention reduces hopelessness after bone marrow transplant patients.

$H_3$. Nurse-led art-based mandala intervention reduces trait anxiety in bone marrow transplant patients.

$H_4$. Nurse-led art-based mandala intervention improves psychological well-being among bone marrow transplant patients.

## Material and Method

### Design

This parallel-group, randomized controlled pilot study was conducted in the allogeneic and autologous transplant unit of a teaching and research hospital.

The trial was registered with under registration number NCT05488717.

### Study Setting and Participants

The G*Power-3.1.9.7 program was used to calculate the sample and power. Considering the study of Doğan (10); in order to determine the sample size, the mean hopelessness pre-test score of the experimental group was 5.05 (±3.72); the mean post-test score was 2.59 (±1.9). In this context, it was determined that a total of 42 bone marrow transplant recipients (21 per group) should be included in the study with 80% strength at the 5% type I error level. Assuming that each group will experience a 10% loss after the intervention, the final sample size was determined as 46.

Patients who were (1) between the ages of 18 and 65, (2) hospitalized for bone marrow transplantation, (3) not using antidepressants, anxiolytics, or antipsychotic drugs, (4) not having a physical disability for mandala dyeing and no allergy to mandala dyes, (5) not having done mandala work before, (6) not practicing spiritual practices such as yoga and meditation, and (7) being literate and volunteering enough to fill the scales were included. Patients who (1) had communication difficulties, (2) had psychiatric illnesses, or (3) received any psychological support during the bone marrow transplantation process were excluded from the study. Assurance has been given that all rights and information will be secured and kept. Informed consent was obtained from all patients. After the patients filled out this form, they completed the questionnaire and scale used in the research.

### Randomization and Blinding

The physician in charge of the allogeneic and autologous transplant unit reported the list of patients who met the inclusion criteria to the principal investigator Ayşe Çetin Üçeriz (A.Ç.Ü) on a daily basis. A.Ç.Ü. assessed each patient's eligibility and introduced the study protocol. Between January 15, 2022, and September 31, 2022, a total of 46 bone marrow transplant recipients were enrolled in the study, with 23 in the intervention group and 23 in the control group, randomized using IBM SPSS v.27 Package program. To ensure impartiality, an independent external investigator conducted randomization. Furthermore, the data were analyzed by an impartial statistician that was unaware of the intervention and control groups. The study involved random sample selection and blinded data reporting by the evaluator. The research's consolidated standards of reporting trials flowchart was created (Figure 1).

### Nurse-led Intervention and Data Collection

Mandala, which is an occupation that relaxes the human mind, was used in the cancer patient group because it is a kind of meditation therapy that allows the individual to evaluate the physical and psychological conditions, improves negative mood, protects, and improves the psychological well-being of individuals (5,6,9). In the research planned in this direction, ready-made stencil mandala coloring papers and 12 colored dry paints, crayons, and felt-tip crayons were provided to each participant in the experimental group by the researcher. The relevant

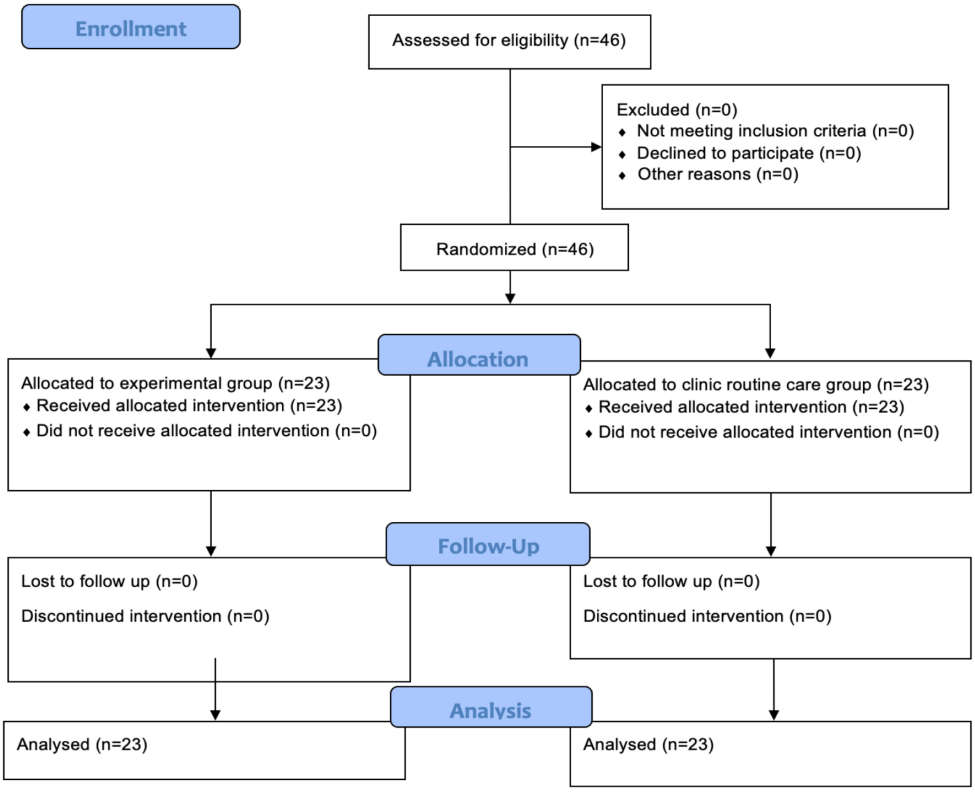


**Figure 1.**
**CONSORT flow diagram**
CONSORT=consolidated standards of reporting trials

literature states that counseling to be given to cancer patients during the treatment period can be given at least 6 or 8 face-to-face sessions (11). Subsequently, the patients in the experimental group were made to apply mandala with ready-made stencil mandala coloring papers for a total of 7 sessions for 30 minutes, accompanied by music containing nature or instrumental sounds (Figure 2). Music was used only during painting so that the patients did not feel as though they were in a hospital environment. No intervention was made by the researcher other than preparation of the environment and time management during staining.

The scales used in the study were completed by the intervention and control groups before the transplant, on the day of the transplant, and at the 48th hour after the transplant (Figure 3).

The data were collected using the patient information form, beck hopelessness scale, distress thermometer, psychological well-being scale and state-trait anxiety inventory (STAI).

**Patient Information Form**

The patient information form, which was developed by the researchers in accordance with the relevant literature, comprised 11 questions (1-3). These questions cover socio-demographic characteristics (such as gender, marital status, educational background, and socio-economic level), variables related to the disease process (including diagnosis, type of transplant, number of transplants, chemotherapy protocol used, and presence of additional chronic disease), and interest in any form of art (4,9-11).

**Beck's Hopelessness Scale**

The Beck hopelessness scale, which aims to measure a person's negative expectations or degree of pessimism for the future, was developed by Beck et al. (12). There are 20 expressions with yes or no answer options on the scale used to evaluate the hope/hopelessness of the individual. The answer to 11 statements on the scale is expected to be yes (2, 4, 7, 9, 11, 12, 14, 16, 17, 18, 20) and the answer to 9 statements is expected to be no (1, 3, 5, 6, 8, 10, 13, 15, 19). If the expected

**Figure 2.**
**Art-based Mandala Intervention Products for Bone Morrow Transplant Recipients**

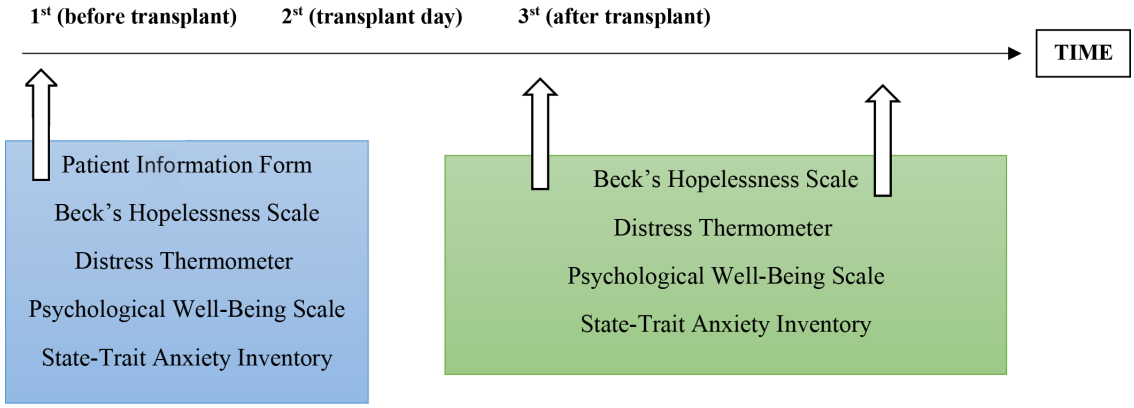


**Figure 3.**
**Study Measurements Outcome Measurements**

answers are given by the individual, 1 point is given to the statements, and 0 points are given if an unexpected response is given. By adding up the scores of the answers given, the total score of the scale, ranging from 0 to 20, is determined; a low score indicates a high level of hope, and a high score indicates a low level of hope (12). The reliability and validity of the scale, which was adapted to Turkish by Seber (13), has been studied several times by different researchers (14,15). Seber (13) evaluated Cronbach's alpha as 0.86 in depressed patients; Durak and Palabıyıkoğlu (15) found it to be 0.85 in psychiatric patients. In this study, Cronbach's alpha coefficient was 0.94.

### Distress Thermometer

The distress thermometer, which was created by Roth et al. (16) to assess psychosocial distress in patients with cancer, is a visual analog scale resembling a thermometer, with numbers ranging from 0 to 10 for individuals to self-assess. This 3-level thermometer measures distress on a scale of 0-10 and prompts the patient to indicate the level of distress experienced over the past week. A score of 4 indicates clinically significant distress. In our country, Özalp et al. (17) established the validity and reliability of the distress thermometer, determining a distress cut-off point to be 4. This study showed that the scale could effectively differentiate between patients with cancer experiencing distress and those who did not. Additionally, the study obtained a Cronbach's alpha coefficient of 0.79.

### Psychological Well-being Scale

The psychological well-being scale, initially developed by Diener et al. (18) was later renamed the "flourishing scale" in 2010 to better capture the essence of well-being. In this study, the original name "psychological well-being scale" was used due to the unavailability of an exact Turkish equivalent for the word "flourishing". The scale consists of eight positively expressed items, with responses ranging from 1 (strongly disagree) to 7 (strongly agree). The total score can range from 8 to 56, with a higher score indicating greater psychological well-being (19). A study conducted in our country found that the Cronbach's alpha internal consistency coefficient of the scale was 0.87, whereas in this study, Cronbach's alpha coefficient was 0.90.

### State-trait Anxiety Inventory (STAI)

Developed by Spilberger in the United States in 1970 to assess state and trait anxiety, the STAI contains 40 statements; the first 20 address state anxiety, and the last 20 address trait anxiety. The section with persistent expressions of anxiety was used. The person answering the scale questions usually marks how he feels on a 4-point Likert-type scale, which includes the answer choices "almost never" (1), "sometimes" (2), "a lot of time" (3), "almost always" (4). Seven (1, 6, 7, 10, 13, 16, 19) of the trait anxiety statements are true statements, and 13 (2, 3, 4, 5, 8, 9, 11, 12, 14, 15, 17, 18, 20) are inverse. Inverse statements expressing positive emotions are scored, those with a weight value of 1 are converted to 4, and those with a weight value of 4 are converted to 1. When evaluating the scale, the point sum of the negative statements is subtracted from the point total of the positive statements, and a constant number 35 is added to the value found. The high score obtained indicates the high level of anxiety, the resulting score; it is classified as no anxiety between 0-19, mild anxiety between 20-39, moderate anxiety between 40-59, severe anxiety between 60-79, and panic and crisis state with a score of 80-79 (20). The adaptation of the STAI to Turkish in Turkey and its reliability validity were made by Oner and Le Compte (21). The test-retest reliability of the scale, which was applied twice to five different student groups, was 0.71-0.86; the internal consistency coefficient was found to be between 0.83 and 0.87. In this study, Cronbach's alpha coefficient was 0.85.

### Statistical Analysis

The data were analyzed using the Statistical Package for the Social Sciences IBM 27.0 package data program. Whether the pre-analysis data met the values of the test used, the normality of the score distributions, the equality of the variances of the difference scores (sphericity), and the homogeneity of the slope were determined by the Kolmogorov-Smirnow test. Descriptive statistics of the variables (mean, standard deviation, median, minimum-maximum, frequency values and chi-square test results) are presented. Covariance analysis was used for repeated measurements. He argued that the f-test is resistant to normal deviations if there are more participants than the number of dependent variables in the cell with the smallest number of people and the number of people in the cells is equal. Since the number of participants in the experimental and control groups was equal and larger than the number of dependent variables, the analysis was assumed to be strong when the data deviated from normal. It recommends the use of the Greenhouse-Geisser test if the spoonerism count is not met. In accordance with this recommendation, statistical analyses were carried out in this research. Because the homogeneity of the slope was not met only in the psychological well-being variable, the measurements on the day of transplantation and after low and high levels of the covariate were compared. If the f-tests were found to be statistically significant, the Bonferroni test was applied as a post-hoc test to keep the global error rate (familywise error) at 0.05. The statistical significance level was determined as $p<0.05$.

### Ethical Considerations

The data used in the submitted manuscript were obtained in accordance with the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization to the Convention on Biological Diversity. The study will adhere to the ethical principles of the Declaration of Helsinki. Ethical approval for the study was obtained from the İstanbul Sabahattin Zaim University Scientific Research and Publication Ethics Committee (no: E-20292139-050.01.04-22860, date: 28.01.2022). Written permission was obtained from the İstanbul University, İstanbul Faculty of Medicine of

Internal Medicine, Department of Hematology (document ID: 675008), the institution where the study was conducted. Written permissions were received via e-mail from the respective authors of the scales.

## Results

### Demographic and Clinical Information

The socio-demographic characteristics of patients who underwent bone marrow transplantation were similar. Most of the included patients were female, married, and had a moderate income. The most common diagnoses were multiple myeloma (30.4%), lymphoma (28.3%), and acute lymphoblastic leukemia (13%). The most preferred high-dose chemotherapy protocol was the combination of melphalan and prednisolone (43.5). A total of 91.3% of the patients were hospitalized for bone marrow transplantation for the first time. In terms of transplant type, both groups had similar proportions of transplants. In addition to cancer, 18 patients (39.1%) with chronic diseases were included in the study. When the patients were evaluated in terms of their interest in art, 71.7% stated that they had not been involved in any artistic activity before (Table 1).

***Table 1.***
***Baseline Characteristics of the Intervention and Control Groups (n=46)***

| | **Intervention group (n=23)** | **Control group (n=23)** | **p value[a]** |
|---|---|---|---|
| **Gender** | | | |
| Female<br>Men | 11 (47.8%)<br>12 (52.2%) | 12 (52.2%)<br>11 (47.8%) | 0.768 |
| **Marital status** | | | |
| Married<br>Single | 16 (69.9%)<br>7 (30.4%) | 18 (78.3%)<br>5 (21.7%) | 0.502 |
| **Education level** | | | |
| Illiterate<br>Primary school<br>Secondary school<br>University and above | 10 (43.5%)<br>5 (21.7%)<br>4 (17.4%)<br>4 (17.4) | 7 (30.4%)<br>6 (26.1%)<br>7 (30.4%)<br>3 (13%) | 0.653 |
| **Perceived economic situation** | | | |
| Low<br>Medium<br>High | 7 (30.4%)<br>14 (60.9%)<br>2 (8.7%) | 3 (13%)<br>18 (78.3%)<br>2 (8.7%) | 0.890 |
| **Diagnosis** | | | |
| Multiple myeloma<br>Acute myeloid leukemia<br>Acute lymphoblastic leukemia<br>Chronic lymphocytic leukemia<br>Lymphoma<br>Chronic myeloid leukemia<br>Myelofibrosis | 9 (39.1%)<br>3 (13%)<br>2 (8.7%)<br>1 (4.3%)<br>7 (30.4%)<br>1 (4.3%)<br>0 (0%) | 5 (21.7%)<br>2 (8.7%)<br>4 (17.4%)<br>1 (4.3%)<br>6 (26.1%)<br>2 (8.7%)<br>3 (13%) | 0.804 |
| **Bone marrow transplantation** | | | |
| Autologous<br>Allogeneic | 16 (69.9%)<br>7 (30.4%) | 11 (47.8%)<br>12 (52.2%) | 0.134 |
| **Chemotherapy protocol** | | | |
| BuCyE (busulfan, cyclophosphamide, etoposide),<br>BuEM (busulfan, etoposide, melphalan)<br>TECAM (thiotepa, etoposide, cytarabine, cyclophosphamide, melphalan)<br>CBV (cyclophosphamide, etoposide, carmustine)<br>FLAG-IDA (fludarabine, cytarabine, idarubicin, G-CSF)<br>MP (melphalan and prednisolone combination),<br>VMCP (vincristine, melphalan, cyclophosphamide, and prednisolone)<br>Cyclophosphamide, ATG, G-CSF | 1 (4.3%)<br>2 (8.7%)<br>1 (4.3%)<br>0 (0%)<br>1 (4.3%)<br>13 (56.5%)<br>0 (0%)<br>5 (21.7%) | 0 (0%)<br>5 (21.7%)<br>4 (17.4%)<br>1 (4.3%)<br>1 (4.3%)<br>7 (30.4%)<br>1 (4.3%)<br>4 (17.4%) | 0.223 |

***Table 1.***
***Continued***

| | Intervention group (n=23) | Control group (n=23) | p value[a] |
|---|---|---|---|
| **Number of bone marrow transplants** | | | |
| 1<br>2 | 21 (91.3%)<br>2 (8.7%) | 21 (91.3%)<br>2 (8.7%) | 1 |
| **Additional chronic diseases** | | | |
| Yes<br>No | 8 (34.8)<br>15 (65.2) | 10 (43.5%)<br>13 (56.5%) | 0.546 |
| **Interest in art** | | | |
| Yes<br>No | 9 (39.1%)<br>14 (60.9%) | 4 (17.4%)<br>19 (82.6%) | 0.102 |

*[a]=independent sample t-test and chi-square test, G-CSF=granulocyte colony-stimulating factor*

### The Effects of Nurse-led Art-based Mandala on Hopelessness

When the pre-transplant hopelessness scores were controlled, the difference between the hopelessness scores of the experimental and control groups, consisting of the combination of the day of transplantation and after, was statistically significant (F1.43=76.03, p<0.00). In addition, the time-dependent change in mean hopelessness scores on the day of transplantation and after transplantation was statistically significant (F1.43=28.80; p<0.00). Similarly, the effect of the group on hopelessness scores varied depending on time and pre-transplant scores (F=7.99 vs. 23.67, p<0.05). When the results of the Bonferroni test were examined as a post-hoc test to determine which measurements caused the difference between the groups, it was revealed that the hopelessness scores were lower in the experimental group ($\bar{x}$=7.35) than in the control group ($\bar{x}$=14.00). A similar situation applies to post-transplant measurements. When the partial eta-squared ($\eta^2$) time and interaction effects were controlled, 0.65 of the variance in hopelessness scores was due to group membership (Table 2). As a result, although the mean scores of hopelessness at the beginning of the study did not differ between the experimental and control groups, the level of hopelessness on the day of transplantation decreased significantly after nurse-led mandala application in the experimental group and continued to decrease after transplantation. In the control group, mean scores for hopelessness before and after transplantation were higher than those in the experimental group (Table 3).

### Effects of Nurse-led Art-based Mandala on Distress

The difference between the pre-transplant distress scores and the composition of the experimental and control groups on and after the transplantation day was statistically significant (F=8.60, p<0.00). However, the time-dependent change in the mean scores of distress on the day of transplantation and after transplantation was not significant (F=0.52; p>0.05). According to the results of the Bonferroni test, which is used to determine the measurements caused by the difference between the groups, the distress scores obtained on the day of transplantation were lower in the control group ($\bar{x}$=8.00) than in the experimental group ($\bar{x}$=4.13). A similar situation applies to post-transplant measurements. When the partial eta-squared ($\eta^2$) time and interaction effects were controlled, 0.55 of the variance in distress scores was due to group membership (Table 2). As a result, the mean score of distress at the beginning of the study was above the limit value of 4 in both groups, although there was no difference between the experimental and control groups, and the level of distress on the day of transplantation decreased significantly after the nurse-led mandala application in the experimental group, but it was still above the limit value, and after the transplantation, it was seen that it fell approximately 50% below the limit value. In the control group, the mean pre- and post-transplant distress scores were high (Table 3).

### Effects of Nurse-led Art-based Mandala on Psychological Well-being

The difference in mean well-being scores between the experimental and control groups on and after transplantation was statistically significant (F1.43=43.19, p<0.00). However, the difference between the groups varied depending on the pre-test scores (F1.43=27.00, p<0.00) (Table 2). According to Figure 4, the well-being of the participants in the experimental group was higher on the day of transplantation and after transplantation than that of the control group. However, the measurements of patients with high pre-transplant well-being on the day of transplantation and after transplantation change less than those with low levels. As a result, when the study began, there were no significant differences in psychological well-being scores between the experimental and control groups. However, the nurse-led mandala intervention in the experimental group led to a notable increase in psychological well-being on the day of transplantation, and this positive effect continued after the transplantation. In contrast, both pre- and post-transplant psychological well-being scores in the control group were lower than those in the experimental group. In the control group, no change was observed on the day of transplantation, but improvement was evident after the transplantation (Table 3).

***Table 2.***
***Comparison of Hopelessness, Distres, Psychological Well-being, Trait Anxiety Intervention, and Control Groups Over Time (n=46)***

| | **Distres** | | | **Trait anxiety** | | | **Hopelessness** | | | **Psychological well-being** | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **F** | **p** | **$\eta^2$** | **F** | **p** | **$\eta^2$** | **F** | **p** | **$\eta^2$** | **F** | **p** | **$\eta^2$** |
| Time | 0.52 | >0.05 | 0.01 | 0.66 | >0.05 | 0.02 | 28.80 | **<0.00** | 0.40 | 16.97 | **<0.00** | 0.29 |
| Group | 8.60 | **<0.00** | 0.55 | 10.82 | **<0.05** | 0.20 | 76.03 | **<0.00** | 0.65 | 43.19 | **<0.00** | 0.51 |
| Time*group | 2.42 | >0.05 | 0.05 | 00.06 | >0.05 | 0.00 | 7.99 | **<0.00** | 0.16 | 0.96 | >0.05 | 0.02 |

*F=mixed One-Way ANOVA (repeated measures with between subjects factor) test, p<0.00, values in bold are statistically significant*

***Table 3.***
***Mean scores of the Hopelessness, Distres, Psychological Well-being, Trait Anxiety Intervention and Control Groups Over Time (n=46)***

| | **Before transplant** | | **Transplant day** | | **After transplant** | |
|---|---|---|---|---|---|---|
| | **Intervention ($\bar{x}$ ± SD)** | **Control ($\bar{x}$ ± SD)** | **Intervention ($\bar{x}$ ± SD)** | **Control ($\bar{x}$ ± SD)** | **Intervention ($\bar{x}$ ± SD)** | **Control ($\bar{x}$ ± SD)** |
| Hopelessness | 13.87±3.31 | 13.83±0.83 | 7.35±5.67 | 14.00±0.74 | 5.17±5.44 | 13.78±0.60 |
| Distres | 6.34±0.51 | 6.96±0.44 | 4.13±2.85 | 8.00±2.02 | 2.26±1.86 | 6.83±2.04 |
| Psychological well-being | 32.74±0.20 | 28.13±0.73 | 45.74±1.84 | 28.13±6.82 | 50.26±1.91 | 33.65±1.15 |
| Trait anxiety | 59.30±3.64 | 60.30±3.02 | 48.43±3.19 | 51.13±4.39 | 44.57±4.40 | 47.83±5.21 |

*SD=standard deviation*

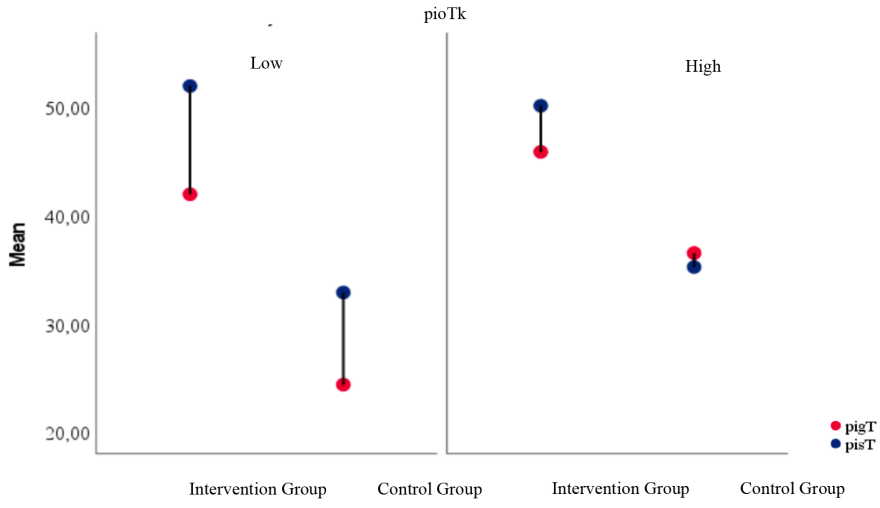


**Figure 4.**
**Drop-line Graph of Patients' Measurements on the Day of Transplantation and After the Transplantation According to Their Pre-transplant Psychological Well-being**
piogT=transplant day, piosT=after transplantation, pioTk=before transplantation

### Effects of Nurse-led Art-based Mandala on State-trait Anxiety

The difference in the mean scores of trait anxiety on the day of transplantation and after transplantation between the experimental and control groups was statistically significant (F=10.82, p<0.00). However, the time-dependent change in the mean trait anxiety scores on the day of transplantation and after transplantation was statistically insignificant (F=0.66; p>0.05). In addition, the effect of the group on trait anxiety scores did not change depending on time and pre-transplant score averages (F=0.06 and 0.34, p>0.05). The Bonferroni test was applied as a post-hoc test to determine which measurements caused the difference between the groups. The Bonferroni test revealed that trait anxiety scores obtained on the day of transplantation were lower in the experimental group ($\bar{x}$=48.43) than in the control group ($\bar{x}$=51.13). A similar situation applies to post-transplant measurements. When the partial eta-squared ($\eta^2$) time and

interaction effects were controlled, 0.20 of the variance in trait anxiety scores was attributed to group membership (Table 2). As a result, even though the average score of trait anxiety at the beginning of the study was similar between the experimental and control groups, both groups experienced moderate anxiety. After the nurse-led mandala application in the experimental group, the average trait anxiety scores decreased more than those in the control group on the day of transplantation. However, the anxiety levels continued to be classified as moderate (Table 3).

## Discussion

Stress is one of the most commonly reported psychiatric problems during bone marrow transplantation process (22). Stress, which varies between 15% and 40%, can be observed before, during, or after transplantation. In addition, studies have reported that the incidence of stress in the bone marrow transplantation process is high in the pre-transplant period and decreases on the day of transplantation and after transplantation (23-26). In our study, distress levels were high in both groups during the pre-transplant period. However, the highest level of stress was observed on the day of transplantation in the control group and before transplantation in the intervention group. On the day of transplantation, the stress level of the intervention group decreased, whereas that of the control group increased. This difference was assumed to be due to the fact that the control group received only routine care until the day of transplantation. The post-transplant distress scores show a 4-point difference between the intervention and control groups; that is, the nurse-led art-based mandala application is effective for patients in the long term. In the relevant literature, it has been stated that art-based practices provide an increase in coping resources and a significant decrease in stress level; it suggests that it can be used for relaxation, consolation, and healing in patients and reduces psychological symptoms, supporting our research results (26-28).

When studies on hopelessness are examined, approximately 23% of patients with cancer experience hopelessness (27,29). Although there are no clear data on the level of hopelessness of bone marrow transplant recipients, it is thought that the perception of cancer as a fatal disease causes cognitive and behavioral problems due to the uncertainty brought about by the current treatment, ignorance about the treatment process, and the post-treatment period, and therefore causes a sense of hopelessness in individuals (30-32). In the current study, it was determined that patients experienced hopelessness during the entire transplantation process, with the highest rate observed before transplantation in the intervention group and on the day of transplantation in the control group. The fact that the level of hopelessness decreased in the post-transplant period in both groups, but the statistically significant difference was in the intervention group, indicates that nurse-led art-based mandala practice is effective in reducing hopelessness. In support of our results, the literature reports that art-based practices contribute to inner progress by providing the individual's awareness and ego development, that creating an environment to spend time with the patient is beneficial for the patient, can contribute to the purification of negative thoughts, and thus is an effective method to increase the level of hope and well-being (28).

When the studies on anxiety are examined, it is stated that the rate of experiencing anxiety in individuals diagnosed with cancer varies between 6% and 34%, this rate can increase up to 49%, and 80% of patients experience anxiety, especially in the first period of the treatment process (24). Studies conducted in bone marrow transplant recipients suggest that the rate of anxiety increases by 29% and between 2% and 15% in the first year after transplantation (23,33). In the present study, although there was no statistically significant difference between time-dependent trait anxiety scores when trait anxiety scores were considered, there was a statistically significant difference was observed between the groups. It can be assumed that the reason for this is the difficulties faced by the patients (chemotherapy side effects, transplant complications, etc.), donor problems (lack of a suitable donor, whether the amount of product will be sufficient, etc.), the success rate of the transplant, uncertainties about the future, and the recurrence of the disease (29). Both groups initially experienced moderate anxiety, which is consistent with the emotional challenges of undergoing bone marrow transplantation (28). However, the experimental group showed a greater decrease in anxiety levels after using the mandala application, suggesting that this nurse-led art-based intervention may be more effective in reducing anxiety compared to standard care. Although anxiety levels remained moderate, the significant reduction indicates that the intervention had a notable impact on emotional regulation during the transplantation process. Contrary to the findings in the literature, both groups in our study exhibited increased anxiety during the post-transplant period. This discrepancy may be attributed to the limited duration of the post-transplant period in the current studies, which prevented a comprehensive assessment of long-term effects.

Studies on cancer and psychological well-being indicate that having a cancer diagnosis is negatively related to social, occupational functioning, and psychological well-being, and that the worsening of the course of the disease after an individual's cancer diagnosis poses a risk of negatively affecting psychological well-being (34,35). Similarly, at the beginning of our study, the psychological well-being of patients involved in the bone marrow transplantation process had the lowest level among both groups. It is stated that after the psychological support provided to bone marrow transplant recipients, patients often express many positive psychological emotions, especially gratitude, determination, and optimism (35-37). Family support, providing social support environments, and being able to participate in activities are sources of positive psychological experiences after transplantation. Cognitive

behavioral therapy interventions are beneficial, and art-based interventions are effective among the methods that provide short-term benefits in increasing psychological well-being, such as depression and anxiety (38-40). The findings of this study suggest that participating in a nurse-led art-based mandala practice can have a positive impact on the psychological well-being of individuals undergoing bone marrow transplantation. The significant increase in psychological well-being observed in the group practicing mandala art on the day of transplantation suggests that engaging in creative and reflective activities may help patients emotionally and mentally adapt to this challenging process. Furthermore, sustained well-being after transplantation indicates that these interventions may provide long-term benefits. In contrast, the control group had lower psychological well-being scores with no improvement on the day of transplantation, suggesting that standard care may not fully address the emotional needs of patients. The slower recovery observed in the control group after transplantation could be due to the natural healing process, but the difference in improvement compared with the group practicing mandala art highlights the potential benefits of early psychological interventions. Studies conducted with other patient groups using art-based mandala practice support our research results (8-10,16,41,42).

### Study Limitations

The study's major strength lies in its use of a randomized controlled trial design, which is known for reducing bias and confounding variables and providing more consistent causal effects. Additionally, this is the first study to report a nurse-led art-based mandala program tailored for bone marrow transplant recipients, both before and after transplantation. The involvement of A.Ç.Ü. experts in cancer care, who are trained in art-based mandalas, further strengthens the study. However, the study was limited by its implementation in a single center, preventing the generalization of the results to all bone marrow transplant recipients. Furthermore, the short follow-up period restricted the investigation of long-term effects, and the inability to use a double-blind method poses another challenge.

## Conclusion

Studies examining the effectiveness of nurse-led mandalas and other artistic activities on patients with cancer stated that they can reduce stress, process traumatic memories, gain a holistic perspective on the self, increase well-being, improve self-image, strengthen positive emotions, alleviate distress, clarify existential problems, and control emotional conflicts. In light of all this information, it has been determined that the nurse-led art-based mandala application in the bone marrow transplant patient group reduces the mean scores of distress, trait anxiety, and hopelessness before the transplant, on the day of transplantation, and after the transplant, and increases the psychological well-being scores of the patients. In addition, the materials used in the art-based mandala application are harmless, inexpensive, and easily accessible, making them suitable for use in bone marrow transplant recipients. Nurses can guide patients in the use of art-based mandalas during the bone marrow transplant process.

### Implications for Practice

The current study indicated that nurse-led art-based mandala practice significantly improves the care of bone marrow transplant recipients by addressing their psychosocial needs. Integrating this approach into clinical practice will allow nurses to provide more holistic support and enhance patients' overall well-being.

### Recommendations

It has been found that integrating art-based nursing practices into the care of bone marrow transplant recipients is beneficial. The use of art-based mandala intervention during bone marrow transplantation has been shown to reduce psychosocial symptoms and lead to positive clinical outcomes. Consequently, nurses should actively incorporate mandalas and other art-based practices into their clinical work, take the lead in making these practices more widely available, and support their use with high-quality research studies.

**Ethics Committee Approval:** The study will adhere to the ethical principles of the Declaration of Helsinki. Ethical approval for the study was obtained from the İstanbul Sabahattin Zaim University Scientific Research and Publication Ethics Committee (no: E-20292139-050.01.04-22860, date: 28.01.2022).

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### Footnotes

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