

## ORIGINAL ARTICLE

## Quality of Life, Outcomes

# The effects of mandala coloring on fatigue, psychological well-being, and coping with stress in patients receiving hemodialysis treatment

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**Abstract**

**Background:** Hemodialysis is an important health problem that negatively affects psychosocial status and support systems. Through practices such as mandala coloring, individuals transfer the unknowns they experience to the outside and make them visible. This study was conducted to examine the effects of mandala coloring on fatigue, psychological well-being, and factors associate with coping with stress in patients receiving hemodialysis treatment.

**Methods:** The design was a prospective, parallel-group controlled trial. The study was conducted in the dialysis unit of a university hospital in eastern Turkey between April 4 and October 31, 2022, with a total of 60 patients, 30 in the intervention group, and 30 in the control group. The patients in the intervention group colored mandala once a week for 2 h, for a total of 8 weeks. The data were collected face-to-face using a patient information form, a Fatigue Severity Scale, a Psychological Well-Being Scale, and a Ways of Coping Questionnaire.

**Results:** There were improvements in fatigue severity and psychological well-being over the 8-week study period in both the intervention and control groups. Scores were similar at baseline in the control and intervention groups, but better in the intervention groups compared to controls at 4 and 8 weeks for both metrics ( $p < 0001$ ). Five factors from the Ways of Coping Questionnaire (self-confident approach, optimistic approach, seeking social support, helpless approach, and submissive approach) each improved during the 8-week period in the intervention group ( $p < 0.001$ ). Three of these five factors improved in the control group as well. Scores for each of the five coping factors were better in the intervention group compared to controls at 4 and 8 weeks ( $p < 0.001$ ).

**Conclusion:** Mandala coloring improved fatigue and psychological well-being and was associated with improved patient coping strategies.

**KEYWORDS**

coping with stress, hemodialysis, mandala coloring, psychological well-being

## INTRODUCTION

Common risk factors associated with high anxiety symptoms in hemodialysis patients include concomitant depression, low parathyroid hormone levels, increased comorbidities, prolonged duration of hospital stay, and decreased perceived quality of life.<sup>1</sup> The length of treatment period, a lack of definitive treatment, and inadequate social support systems cause patients to fall short in coping with stressful situations.<sup>2,3</sup> This leads to decreased quality of life in patients, more hospitalizations, higher health care costs, and early mortality.<sup>2</sup> At this point, individuals must be psychologically well in order to cope with the disease and maintain their connection with life.<sup>4</sup> Psychological well-being means an individual's being in harmony with others, experiencing more feelings of meaning, self-esteem, self-confidence, and happiness while experiencing fewer negative emotions and coping with life problems in a healthy way.<sup>5</sup> Psychological well-being makes positive contributions to the lives of individuals. The number of positive experiences in life and the ability of individuals to enjoy the moment affect psychological well-being.<sup>6</sup>

Mandala is an art therapy technique that can provide psychological support and healing. This circular art has traditionally been used for meditation in various Asian cultures and is a symbol of psychological wholeness.<sup>7</sup> *Mandala* is a Sanskrit word meaning "circle, round, wholeness, and completion"; it provides mental calming and relaxation.<sup>8</sup> Mandala is used as a tool to raise awareness, to express oneself, to solve negative problems, and to heal.<sup>9,10</sup> Mandala coloring is a safe and accessible activity that requires no special skills and can be used as a complementary strategy to support mental health.<sup>7</sup>

With practices such as mandala coloring, individuals transfer their unknowns to the outside and make them visible through this creation. The healing process starts with this step. The artistic view of nursing is to understand the needs of individuals, identify the sources of anxiety and stress, and then develop practices that will increase people's self-confidence and resilience by increasing their ability and competence levels.<sup>11</sup> When the literature was searched, mandala coloring was found to have been studied with different patient groups,<sup>7,12,13</sup> but there has been no research of which we are aware evaluating the effectiveness of mandala coloring in patients on hemodialysis. In light of this gap, the present study was conducted to examine the effects of mandala coloring on fatigue, coping with stress, and psychological well-being in patients receiving hemodialysis treatment.

## METHODS

### Study design and the sample

The study design was a prospective, parallel group controlled trial. The study was registered on Clinical Trials (no. NCT05296018). The population consisted of 84 patients who were treated in the dialysis unit of the State Hospital in Elâzığ, Turkey, between April 4 and October 31, 2022. The sample consisted of 60 patients who met the inclusion criteria—at least 18 years of age, able to communicate adequately, having no psychiatric problems, having no vision problems, and receiving hemodialysis treatment for at least 6 months—who agreed to participate in the study. In the post hoc power analysis performed using the G-Power 3.1.9.4 program, it was determined that the effect size of the study was 0.8 at 85%<sup>14</sup> power and a 0.05 significance level.<sup>15</sup> The effect size value is recommended to be  $\geq 0.5$  in clinical studies, and the sample size was found to be sufficient.<sup>14</sup>

Considering that patients undergoing dialysis in the same session could affect each other, the control and study groups were selected according to session days. Patients who met the criteria were grouped according to the time of their dialysis session days. The ballot method was used to determine which group would start the study. After balloting, dialysis patients on a Monday, Wednesday, and Friday schedule were considered the intervention group, whereas those dialyzed on Tuesday, Thursday, and Saturday were defined as the control group.<sup>16</sup>

### Outcome measurements

Research data were collected by face-to-face interviews according to the following questionnaires: a Patient Information Form, a Fatigue Severity Scale (FSS), a Ways of Coping Questionnaire (WCQ), and a Psychological Well-Being Scale (PWBS).

### Patient information form

The form included 14 questions on sociodemographic characteristics (age, gender, marital status, educational status, income status, who the participants lived with) and disease characteristics (diagnosis year, presence of a different chronic disease, any assistive device status, and regular exercise status).

## Fatigue Severity Scale

The FSS used was developed by Krupp et al. in 1989.<sup>17</sup> Validity and reliability evaluation of the Turkish version were conducted by Gencay and Can.<sup>18</sup> The scale contains nine items that measure severity of fatigue symptoms occurring during the previous week. Each item is scored between 1 (*strongly disagree*) and 7 (*strongly agree*). The overall scale score is calculated as the mean value of the nine items. If the total score is below 4, the score is coded as no fatigue; if it is above 4, it is considered evidence for the presence of fatigue. The Cronbach's alpha value of the scale is 0.91,<sup>18</sup> and in the present study, the value of Cronbach's alpha was 0.85.

## Ways of Coping Questionnaire

The WCQ was developed by Folkman and Lazarus in 1980 to evaluate of the manner by which patients cope with stress<sup>19</sup>; validity and reliability tests of the Turkish version of the scale were conducted by Şahin and Durak.<sup>20</sup> Thirty items are scored between 1 (*not at all appropriate*) and 4 (*very appropriate*) on a Likert-type scale. The WCQ evaluates coping mechanisms in various stressful situations such as depression, presence of psychosomatic problems, and loneliness. The questionnaire consists of five factors: self-confident approach, optimistic approach, helpless approach, submissive approach, and seeking social support approach. Of these, self-confident approach, optimistic approach, and seeking social support factors are considered effective coping styles, while helpless approach and submissive approach factors are considered ineffective styles in coping with stress. The results indicate which approaches an individual uses more often in coping with stress. In past evaluation of the WCQ, Cronbach's alpha coefficients were between 0.68 to 0.49 for optimistic approach, between 0.80 and 0.62 for self-confident approach, between 0.73 and 0.68 for helpless approach, between 0.70 and 0.47 for submissive approach, and between 0.47 and 0.45 for seeking social support.<sup>20</sup> In the present study, Cronbach alpha coefficients were found to be 0.70 for optimistic approach, 0.75 for self-confident approach, 0.75 for helpless approach, 0.70 for submissive approach and 0.61 for seeking social support.

## Psychological Well-Being Scale

The eight-item PWBS scale was developed by Diener et al.<sup>21</sup> and adapted into Turkish by Telef<sup>22</sup>; it is a

summary of self-perception that includes an individual's positive interpersonal relationships, feelings of self-efficacy, and having meaning and purpose in life. Responses to scale items range between 1 (*strongly disagree*) and 7 (*strongly agree*). All items are worded positively, and the score range is 8–56. A high score indicates that an individual has many psychological resources and strengths. The Cronbach's alpha value of the scale is 0.80<sup>22</sup>; in the present study, it was 0.86.

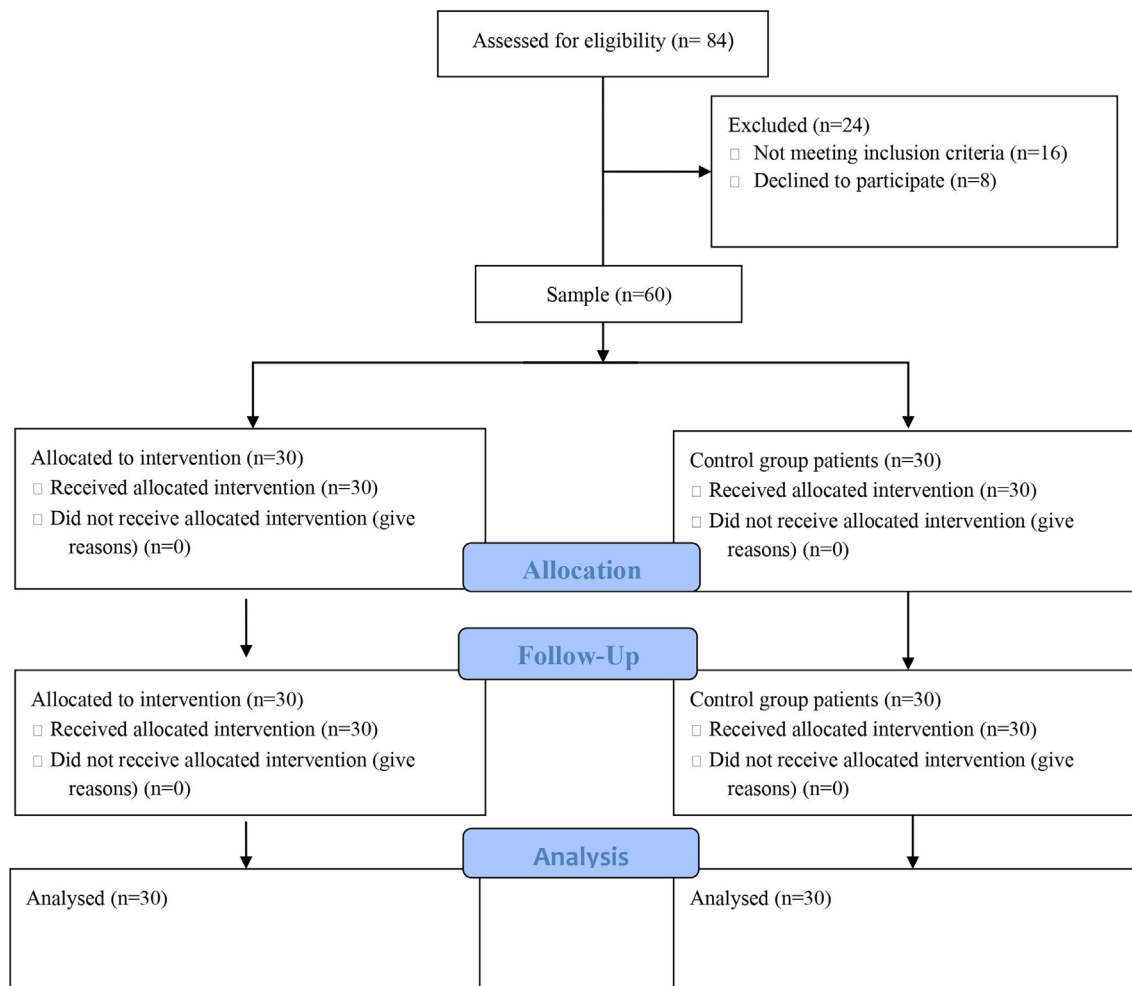
## Intervention

The patients were asked to perform mandala coloring during hemodialysis treatments, once a week, for 2 h, over an 8-week period.<sup>12</sup> Eight preselected mandala drawings were printed on separate pieces of A4 (21.0 cm × 29.7 cm) paper. The patients were given a new drawing to color each week.<sup>7</sup> In studies examining the effect of mandala coloring on the reduction of psychological symptoms, using a circular designed pattern instead of using a square pattern on the mandala template has been reported to have greater effect in symptom management.<sup>23</sup> Therefore, a circular-shaped mandala template was used. Each participant was given mandala coloring sheets and 12 colored pencils (red, orange, yellow, pink, light green, green, sky blue, blue, purple, brown, red brown, and black) by the researcher.<sup>12</sup> The intervention and control groups consisted of 60 patients.

Data from the Patient Information Form, FSS, WCQ, and PWBS were collected from all patients at baseline in both groups. For patients who had difficulty reading, the researcher read the questions aloud to the patient and then recorded their answers. The intervention group colored mandalas in the first hour of hemodialysis. No intervention was made in the control group, who received routine care. Before the hemodialysis treatment in the fourth and eighth sessions, patients in intervention and control groups were administered the FSS, WCQ, and PWBS and then connected to hemodialysis.

## Collection of data

Data from the first, fourth, and eighth weeks were collected from the intervention and control groups by the researcher. When the study was complete, in accordance with the principle of equality in nursing practice,<sup>24</sup> patients in the control group who wanted to color mandala were shown how to do so, but this step occurred only after all research data had been collected.



**FIGURE 1** Research plan.

## Evaluation of data

The analysis of the data obtained in the study was carried out by using SPSS version 25.0. While evaluating the study data, descriptive statistical methods (mean, standard deviation, median, frequency, ratio, minimum, and maximum) as and the normality distribution of the data were evaluated with the Shapiro–Wilk test. Chi-square analysis was conducted to compare demographic characteristics (categorical measures) between the intervention and control groups. Independent groups *t*-test and Mann–Whitney *U*-test were used in the intergroup comparison of the intervention and control groups, while the Wilcoxon signed-rank test was used in intragroup comparison. Effect size is the expected difference between two means according to the outcome variable in order to reveal a statistically significant difference. In this study, Cohen’s *d* was used to calculate the effect size. A Cohen’s *d*-value of 0.20–0.50 means weak effect size, a value of 0.50–0.80 indicates a medium effect size, and a value greater than 0.8 means a strong effect size.<sup>25</sup> The findings obtained were evaluated at the  $p < 0.05$  significance level.

## Ethical considerations

In order to conduct the study, approvals from the Ethics Committee of Istanbul Sabahattin Zaim University (dated January 28, 2022) and official permission from the hospital where the intervention was made (dated March 25, 2022) were sought and received. After patients were informed about the study and asked to participate, their written consent was obtained. This study was carried out in accordance with the ethical standards of the Declaration of Helsinki. All individuals who participated in the study did so voluntarily, and their personal information was kept confidential.

## RESULTS

Eighty-four patients were assessed for potential recruitment between the dates specified in the study. Sixteen patients did not meet the inclusion criteria, and eight others did not want to participate. Thus the study sample consisted of 60 patients, 30 each in the intervention and

**TABLE 1** Descriptive characteristics of the patients ( $n = 60$ ).

Variables	Mean $\pm$ SD	Min-max (median)	$p^*$
<b>Age</b>			
Intervention	30	49.9 $\pm$ 16.95	0.433
Control	30	52.57 $\pm$ 14.79	
<b>Treatment duration (year)</b>			
Intervention	30	7.6 $\pm$ 8.2	0.689
Control	30	8.77 $\pm$ 8.12	
Variables	Group		$p^*$
	Intervention group (n/%)	Control group (n/%)	
<b>Gender</b>			
Female	15 (55.6%)	12 (44.4%)	0.604
Male	15 (45.5%)	18 (54.5%)	
<b>Marital status</b>			
Married	20 (51.3%)	19 (48.7%)	0.787
Single	10 (47.6%)	11 (52.4%)	
<b>Educational status</b>			
Illiterate	5 (71.4%)	2 (28.6%)	0.789
Literate	3 (50%)	3 (50%)	
Primary education	12 (50%)	12 (50%)	
High school	8 (44.4%)	10 (55.6%)	
Undergraduate and higher	2 (40%)	3 (60%)	
<b>Employment status</b>			
Employed	2 (40) %	3 (60%)	0.640
Unemployed	28 (50.9%)	27 (49.1%)	
<b>Income status</b>			
Income less than expenses	14 (51.9%)	13 (48.1%)	0.831
Income equals expense	15 (50%)	15 (50%)	
Income more than expenses	1 (33.3%)	2 (66.7%)	
<b>Individuals living with the patient</b>			
Spouse	8 (47.1%)	9 (52.9%)	0.406
Spouse and children	10 (47.6%)	11 (52.4%)	
Alone	0 (0%)	2 (100%)	
Other	12 (60%)	8 (40%)	
<b>Presence of comorbid disease</b>			
Yes	24 (52.2%)	22 (47.8%)	0.760
No	6 (42.9%)	8 (57.1%)	

(Continues)

**TABLE 1** (Continued)

Variables	Group		$p^*$
	Intervention group (n/%)	Control group (n/%)	
<b>Type of the comorbid disease</b>			
Hypertension	11 (50%)	11 (50%)	0.688
Diabetes	7 (58.3%)	5 (41.7%)	
Heart diseases	2 (28.6%)	5 (71.4%)	
Asthma	4 (80%)	1 (20%)	
No other disease	6 (42.9%)	8 (57.1%)	

Abbreviation: SD, standard deviation.

\*Chi-square test,  $p < 0.05$ .

control groups (see Figure 1). Table 1 shows the findings related to the sociodemographic and disease characteristics of the patients.

Results regarding fatigue severity and psychological well-being are shown in Table 2.

At baseline, the FSS and PWBS were not significantly different in the control and intervention groups. During the 8 weeks of follow-up, scores for both measures improved in both the intervention and control groups. However, the scores at 4 and 8 weeks of follow-up were better in the intervention group compared with controls, for both fatigue severity and psychological well-being.

Results regarding factors associated with patient coping styles, assessed using the WCQ are shown in Table 3. For each of the coping factors analyzed, scores at baseline were similar in the intervention and control groups. In the intervention group, improvement in the scores for each of the five factors tested was found during follow-up compared to the baseline ( $p < 0.001$ ). In the control group, improvement was found for three of the coping factors: self-confident approach, optimistic approach, and submissive approach ( $p < 0.001$  for each). During follow-up, at weeks 4 and 8, scores for each of the coping factors were higher in the intervention group compared with controls ( $p < 0.001$  for each factor).

## DISCUSSION

Our results suggest that mandala coloring once a week predialysis, improved fatigue and psychologic well-being, and also improved a number of factors associated with coping, in hemodialysis patients (Figure 2). The control and intervention groups were similar in terms of sociodemographic and disease-related characteristics and there

**TABLE 2** Comparison of mean intragroup and intergroup Fatigue Severity Scale (FSS) and Psychological Well-Being Scale (PWBS) scores of the patients.

Variables	Intervention group (n = 30) Mean ± SD	Control group (n = 30) Mean ± SD	Test statistic		
			z	p*	Cohen
<b>FSS</b>					
Preintervention	6.23 ± 0.51	6.28 ± 0.4	-0.551	0.582	—
Week 4	4.18 ± 0.46	6.21 ± 0.44	-6.662	<b>0.001</b>	4.509
Week 8	1.89 ± 0.52	6.15 ± 0.44	-6.669	<b>0.001</b>	8.844
Test statistic	60.000	14.297			
p*	<b>0.001</b>	<b>0.001</b>			
<b>PWBS</b>					
Preintervention	20.2 ± 4.33	20.9 ± 4	-0.781	0.435	—
Week 4	33.23 ± 3.87	19.9 ± 3.45	-6.656	<b>0.001</b>	3.636
Week 8	44.3 ± 9.01	20.03 ± 4.44	-6.033	<b>0.001</b>	3.417
Test statistic	48.420	5.880			
p*	<b>0.001</b>	0.053			

Abbreviation: SD, standard deviation.

\*Mann-Whitney U-test, Wilcoxon signed-rank test,  $p < 0.05$  (in bold).

was no statistically significant difference between the two groups in terms of mean scores of fatigue severity, psychological well-being level and stress coping styles.

In our study, a significant decrease was found in the severity of fatigue in patients in both groups, but the score was better in the intervention group compared to controls. There has been, to our knowledge, no previous research examining the effect of mandala coloring on the severity of fatigue in patients on hemodialysis. In their study examining the potential of art therapies to affect the moods of healthy individuals, Ando and Ito<sup>26</sup> found that art therapies could indeed have therapeutic properties, mitigate depression related to stress, improve mood, and reduce fatigue. In a study evaluating the effectiveness of art therapy in cancer patients experiencing fatigue during chemotherapy treatment, it was found that fatigue scores of the patients in the intervention group improved significantly after art therapy.<sup>27</sup> In another study, which examined the effect of painting on fatigue after surgery in breast cancer patients, art therapy also improved fatigue scores.<sup>28</sup> In a systematic review and meta-analysis, mindfulness-based art therapy was found to have the potential to mitigate anxiety, depression and fatigue.<sup>29</sup> Fatigue cannot be explained by physiological mechanisms alone; it also has social and psychological aspects.<sup>30</sup> Fatigue is an important feature of depressive symptoms.<sup>30</sup>

In our study, a significant benefit of mandala coloring was found in terms of psychological well-being. In previous studies conducted with students, mandala

coloring was found to have a positive effect on mood<sup>9,31</sup> on depressive symptoms and anxiety,<sup>32</sup> on mental well-being,<sup>33</sup> and on subjective well-being.<sup>32</sup> Puig et al.<sup>34</sup> reported in a study of newly diagnosed Stage I and Stage II breast cancer patients, that a 4-week art therapy intervention reduced patient negative emotions and improved psychosocial well-being. Similarly, in studies conducted with different individuals (during chemotherapy sessions, elderly individuals, and hospital staff), it was found that mandala coloring improves mood and increases positive emotions.<sup>35-37</sup>

Expressing positive feelings through art and narrative has been found to decrease negative mood.<sup>38</sup> Repeating patterns and symmetrical shapes of a predrawn mandala enhances meditation or awareness while coloring,<sup>39</sup> and awareness has been found to be positively associated with psychological well-being.<sup>40</sup> In this respect, mandala coloring can be considered to be a psychotherapy technique that can provide psychological support and healing<sup>41,42</sup> and can be an effective method for self-healing.<sup>7,43</sup>

In the present study, patients in the intervention group significantly increased their effective styles of coping with stress and decreased ineffective styles of coping with stress. Some improvement in 3/5 coping factors was also found in the control group, but the improvement in each of the five coping factors analyzed was higher in the intervention group compared with controls. Two previous studies have shown that art therapies can be effective as a coping mechanism in women diagnosed with cancer.<sup>44,45</sup> Kaimal et al. found that

**TABLE 3** Comparison of mean intragroup and intergroup Ways of Coping Questionnaire factor scores of the patients.

Variables	Intervention group (n = 30) Mean ± SD	Control group (n = 30) Mean ± SD	Test statistic		
			z	p*	Cohen
<b>Self-confident approach</b>					
Preintervention	12.9 ± 2.5	13.07 ± 2.24	-0.131	0.896	—
Week 4	20.33 ± 1.15	12.7 ± 2.61	-6.624	<b>0.001</b>	3.783
Week 8	23.13 ± 1.7	12.3 ± 2.64	-6.681	<b>0.001</b>	4.877
Test statistic	58.615	9.556			
p*	<b>0.001</b>	<b>0.008</b>			
<b>Optimistic approach</b>					
Preintervention	9.23 ± 1.83	9.4 ± 1.65	0.328	0.743	—
Week 4	15.83 ± 1.84	9.47 ± 1.59	-6.595	<b>0.001</b>	3.698
Week 8	17.8 ± 1.71	8.57 ± 2.16	-6.692	<b>0.001</b>	4.738
Test statistic	52.325	19.419			
p*	<b>0.001</b>	<b>0.001</b>			
<b>Seeking social support</b>					
Preintervention	8.83 ± 0.59	8.9 ± 0.61	-0.424	0.671	—
Week 4	10.9 ± 0.88	8.63 ± 0.85	-6.403	<b>0.001</b>	2.623
Week 8	12.2 ± 0.92	8.7 ± 0.75	-6.735	<b>0.001</b>	4.170
Test statistic	51.297	5.172			
p*	<b>0.001</b>	0.075			
<b>Helpless approach</b>					
Preintervention	23.67 ± 1.83	23.77 ± 1.81	-0.311	0.756	—
Week 4	21.07 ± 1.91	23.83 ± 1.72	-5.555	<b>0.001</b>	1.518
Week 8	15.47 ± 0.86	24.03 ± 1.71	-6.724	<b>0.001</b>	6.324
Test statistic	55.580	1.902			
p*	<b>0.001</b>	0.386			
<b>Submissive approach</b>					
Preintervention	17.57 ± 1.65	17.67 ± 1.37	-0.008	0.994	—
Week 4	16.47 ± 1.41	18.03 ± 1.5	-3.681	<b>0.001</b>	1.071
Week 8	13.5 ± 1.55	18.23 ± 1.59	-6.351	<b>0.001</b>	3.012
Test statistic	39.383	11.842			
p*	<b>0.001</b>	<b>0.003</b>			

Abbreviation: SD, standard deviation.

\*Mann-Whitney U-test, Wilcoxon signed-rank test,  $p < 0.05$  (in bold).

engaging in art activities led to a significant decrease in the cortisol levels of the healthy adults. The participants remarked that they found art making activities relaxing, fun, and useful in learning new aspects of their selves. Some commented that art therapy helped free themselves from inhibitions.<sup>46</sup> In a study of healthy adults, Meutia,<sup>47</sup> found that mandala coloring reduced stress levels. A number of other studies in various populations like workers and students have found that mandala coloring is a promising holistic approach to reduce stress.<sup>9,48</sup>

Art therapy has been found to have a positive effect on stress management.<sup>48</sup> In addition to reducing stress levels, art therapy methods also encourage feelings of happiness, peace, and relaxation. Mandala coloring is mindfulness-based, and engaging with art creates meditative situations. Theta waves, which increase in meditative situations, rising during creative states and activities that require inner focus, such as meditation, aid in attention and cognitive processing.<sup>49</sup>

The described nurse-led, non-pharmacological mandala coloring activity is cost-effective, does not require



**FIGURE 2** Mandala coloring examples used in the study.

additional training, and is easy to apply; hence, it can be applied economically to patients in hemodialysis units. Mandala templates and crayons can be placed next to each patient's dialysis station, and the coloring activity can be suggested to patients, with the cooperation of other members of the patient care team.

## LIMITATIONS OF THE STUDY

More studies are needed on symptom control and improving the psychological well-being of patients on hemodialysis.<sup>50,51</sup> The present study was conducted in a single center with a limited number of patients, limiting its generalizability. Although the intervention and control groups were quite similar, patient selection was not randomized, and it is difficult to conduct such studies using a blinded design. Both patients and researchers were aware of the intervention in progress; this may have influenced the results.

## CONCLUSION

Mandala coloring improved fatigue and psychological well-being in our population of hemodialysis patients. A number of factors associated with effective coping with stress were improved. Mandala coloring can be easily and economically implemented in hemodialysis units, and also can be done by patients at home. Its use in patient symptom management deserves continued study.

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## CONFLICT OF INTEREST STATEMENT

The authors have no conflict of interest to disclose.

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