

Original Article  
Psychiatry & Psychology



# Effects of Mindfulness-Based Art Therapy on Psychological Symptoms in Patients with Coronary Artery Disease

Seung-Ho Jang <sup>1</sup>, Jae-Hee Lee <sup>2,3</sup>, Hye-Jin Lee <sup>3</sup> and Sang-Yeol Lee <sup>1</sup>

<sup>1</sup>Department of Psychiatry, School of Medicine, Wonkwang University, Iksan, Korea

<sup>2</sup>Research and Administrative Team, Seoul National University Bundang Hospital, Seongnam, Korea

<sup>3</sup>Department of Public Health, Wonkwang University Graduate School, Iksan, Korea



Received: Sep 20, 2017

Accepted: Dec 21, 2017

Address for Correspondence:

Sang-Yeol Lee, MD, PhD

Department of Psychiatry, School of Medicine,  
Wonkwang University, 895 Muwang-ro,  
Iksan 54538, Republic of Korea.  
E-mail: psysangyeol@hanmail.net

© 2018 The Korean Academy of Medical  
Sciences.

This is an Open Access article distributed  
under the terms of the Creative Commons  
Attribution Non-Commercial License (<https://creativecommons.org/licenses/by-nc/4.0/>)  
which permits unrestricted non-commercial  
use, distribution, and reproduction in any  
medium, provided the original work is properly  
cited.

ORCID iDs

Seung-Ho Jang   
<https://orcid.org/0000-0002-3479-0552>  
Jae-Hee Lee   
<https://orcid.org/0000-0003-3648-0977>  
Hye-Jin Lee   
<https://orcid.org/0000-0002-1039-9196>  
Sang-Yeol Lee   
<https://orcid.org/0000-0003-1828-9992>

Funding

This study was supported by Wonkwang  
University, 2017.

Disclosure

The authors have no potential conflicts of  
interest to disclose.

## ABSTRACT

**Background:** Mindfulness-based art therapy (MBAT) induces emotional relaxation in coronary artery disease (CAD) patients, and is a treatment known to improve psychological stability.

The objective of this study was to evaluate the treatment effects of MBAT for CAD patients.

**Methods:** A total of 44 CAD patients were selected as participants, 21 patients belonged to a MBAT group, and 23 patients belonged to the control group. The patients in the MBAT group were given 12 sessions of treatments. To measure depression and anxiety, Beck Depression Inventory (BDI) and Trait Anxiety Inventory (TAI) were used. Anger and anger expression were evaluated using the State Trait Anger Expression Inventory (STAXI). The treatment results were analyzed using two-way repeated measures analysis of variance (ANOVA).

**Results:** The results showed that significant effects for groups, time, and interaction in the depression (interaction effect, [ $F(1,36) = 23.15, P < 0.001$ ]; between groups, [ $F(1,36) = 5.73, P = 0.022$ ]), trait anxiety (interaction effect, [ $F(1,36) = 13.23, P < 0.001$ ]; between groups, [ $F(1,36) = 4.38, P = 0.043$ ]), state anger (interaction effect, [ $F(1,36) = 5.60, P = 0.023$ ]), trait anger (interaction effect, [ $F(1,36) = 6.93, P = 0.012$ ]; within group, [ $F(1,36) = 4.73, P = 0.036$ ]), anger control (interaction effect, [ $F(1,36) = 8.41, P = 0.006$ ]; within group, [ $F(1,36) = 9.41, P = 0.004$ ]), anger out (interaction effect, [ $F(1,36) = 6.88, P = 0.012$ ]; within group, [ $F(1,36) = 13.17, P < 0.001$ ]; between groups, [ $F(1,36) = 5.62, P = 0.023$ ]), and anger in (interaction effect, [ $F(1,36) = 32.66, P < 0.001$ ]; within group, [ $F(1,36) = 25.90, P < 0.001$ ]; between groups, [ $F(1,36) = 12.44, P < 0.001$ ]).

**Conclusion:** MBAT can be seen as an effective treatment method that improves CAD patients' psychological stability. Evaluation of treatment effects using program development and large-scale research for future clinical application is needed.

**Keywords:** Mindfulness-Based Art Therapy; Coronary Artery Disease; Anger; Depression; Trait Anxiety

## INTRODUCTION

Coronary artery disease (CAD), which consists of angina pectoris and myocardial infarct (MI), is one of the leading causes of death in South Korea, due to the rapid increase of the aging population and changes in people's lifestyles.<sup>1</sup> It is an ischemic heart disease caused by

**Author Contributions**

Conceptualization: Jang SH, Lee JH, Lee SY. Data curation: Jang SH, Lee JH. Formal analysis: Jang SH. Writing - original draft: Jang SH, Lee HJ. Writing - review & editing: Jang SH, Lee JH, Lee SY.

an imbalance between supply and demand of oxygen in cardiac muscles, as coronary arteries narrow. The onset of this disease can cause fatal results such as premature death.<sup>2</sup>

Among the risk factors of CAD, there are incurable factors such as sex, past history, family history, and age. On the contrary, there are factors such as smoking, hypertension, obesity, diabetes mellitus, and hyperlipidemia that can be improved with improved diet, physical exercise, and smoking cessation. These efforts are believed to put blood pressure and cholesterol levels under control, reducing risk for CAD and minimizing relapse effectively.<sup>3</sup> However, these factors alone cannot explain the reasons behind relapse and prognosis of the disease. Recently, more attention has been focused on the connection between the outbreak of CAD and psychological factors.<sup>4</sup>

Such psychological factors that might lead to the CAD incidence and mortality include depression, anxiety, aggression, anger, and stress.<sup>5</sup> CAD patients often suffer from depression. Depressive symptoms or any past history of major depressive disorder (MDD) could increase CAD incidence and mortality rate.<sup>6</sup> Anxiety also shows significant relations with incidence and mortality of CAD. Patients with severe anxiety are more likely to have a relapse after being diagnosed.<sup>7</sup> Research done by Pimple et al.<sup>8</sup> found that there is a correlation between trait anger and myocardial ischemia.

Those with aggression have a poor temperament and are not willing to trust others. Because the so-called “type A behavior pattern” (TABP) has emerged as a possible risk factor in the development of CAD, research has sought to identify such traits as anger or aggression in CAD patients.<sup>9,10</sup> According to Denollet et al.,<sup>11</sup> anger and suppressed anger are related to the development of major cardiac events. Another study by Buckley et al.<sup>12</sup> found that intense anger is associated with higher risks for acute coronary occlusion.

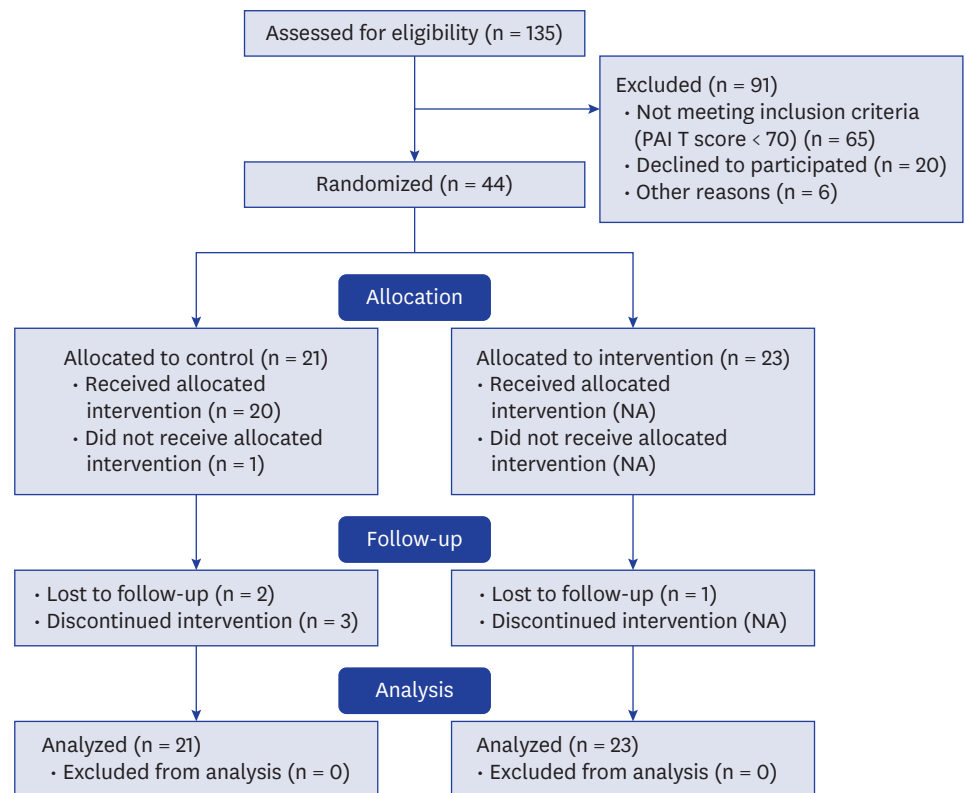
Mindfulness-based art therapy (MBAT) is based on Kabat-Zinn's mindfulness meditation<sup>13</sup> and reflects on mindfulness-based stress reduction (MBSR), Monti's MBAT<sup>14</sup> and the self-regulation theory.<sup>15</sup> The critical element in this theory is to equip patients with the ability to cope that can mature the ego harmoniously by subjectively and objectively expressing the physical and psychological pain they face.

This research aimed to understand the treatment effects of MBAT on CAD patients' depression, trait anxiety, anger and anger expression.

## METHODS

### Subjects

We studied a cohort of 135 CAD patients who were regularly visiting the outpatient clinic and receiving medication at the Wonkwang University Hospital Cardiovascular Center. This research was conducted from March to August 2016. To select subjects who had higher risks of depression, trait anxiety, and anger, we administered the Personality Assessment Inventory (PAI).<sup>16</sup> The number of people used in the study was determined by using G\*Power program 3.1.4 (Heinrich-Heine-Universität Düsseldorf, Düsseldorf, Germany) and the calculated subject when applying  $\alpha = 0.05$ , power 80%, and effect size = 0.25 was 135. A total of 70 participants scored over 70 points in the T-scores on the sub-scales measure of depression (DEP), anxiety (ANX), and aggression (AGG). After the 26 subjects were excluded, 44 subjects were split into



**Fig. 1.** Subject based randomized controlled trial of a mindfulness-based art therapy program among patients with coronary artery disease: CONSORT flow diagram. CONSORT = consolidated standards of reporting trials, PAI = Personality Assessment Inventory, NA = not available.

two groups: 21 belonged to the MBAT group, and 23 to the control group. Before the study, participants were provided detailed explanations regarding study purposes and procedures, based on which they signed research participation agreements indicating consent. Participants were randomly assigned to the MBAT or control group by flipping a coin. As 6 in the MBAT group and 1 in the control group dropped out, only 37 remained as final subjects (Fig. 1).

### Treatment and therapists

Subjects in the MBAT group received 12 sessions lasting 45 minutes each. Mindfulness-based stress reduction-Korean version (K-MBSR)<sup>17</sup> psychological intervention was applied to mindfulness activities. Monti et al.'s<sup>13</sup> 8-week MBAT program based on MBSR was re-structured with a focus on its progress-by-sessions idea. The MBAT group was divided into A (n = 11) and B (n = 12), and the same type of treatment was given to both of them. The therapist encouraged the patients to express their inner pain or feelings sufficiently. The treatment process is displayed in Table 1. The therapist obtained qualifications from Wonkwang University in 2010 and acquired a doctorate in expressive arts therapy with more than 10 years' experience in the field. The therapist is a specialist in mental health medicine. A senior researcher who is a mindfulness meditation-based group art therapy instructor provided clinical supervision.

### Usual care regimen

During our study, all the subjects in both groups continued to have standard post-treatment clinic care that is directly related with their CAD. However, we asked the subjects in the

**Table 1.** Stage-wise goals and curriculum of the MBAT intervention

Session	Subjects	K-MBSR	Mindfulness art activities
1	Self-acceptance	Lecture: What is MBSR? Explanation of MBSR's seven core attitudes Activity: Eating meditation	"Draw a complete picture of yourself" — express yourself as is without self-judgment to discover your image of yourself through drawing
2	Awaken the physical sensations I	Body scan activity	Achieve self-awareness from sensory stimulation through physical replication
3	Awaken the physical sensations II	Body scan activity	Achieve self-awareness of sensory stimulation and response through mindfulness study of art materials using all five senses
4	The mind is where the body is I	Hatha yoga	By expressing emotions before and after hatha yoga, study your mind-body relations through evaluation before and after
5	The mind is where the body is II	Hatha yoga	Become aware of the physical sensations felt during hatha yoga; by expressing to mandala, observe the physical sensations awakening
6	Loving mind I	Meditation practice	Imagine taking care of yourself; then experience the mental, emotional and physical pain changing through drawing
7	Loving mind II	Meditation practice	By taking care of yourself and expressing a loving mind towards others through drawing, experience your mental, emotional and physical pain changing
8	The power of breath	Breathing practice — remain in the present without distraction	Observe the tense and relaxed responses shown in the pictures before the breathing practice and after concentrating on breathing without distraction
9	Realization	Sitting meditation	Use collages to express thoughts and feelings through art, express the thoughts and feelings perceived during the sitting meditation; become self-aware of these automatic and passive thoughts and emotions
10	From negative to positive	Walking meditation	Express happy events as well as unpleasant events that induced stress during the past week through drawing; become aware of yourself lost in thoughts of an event you cannot control
11	Here, now	Crazy walking	Apply your choice of colored paint on the bottom of your feet and walk briskly across paper on the ground; after five steps, change your direction and allow your mind to concentrate on the present moment
12	Beginner's mind	Review the program and explore your own meditation method and finish with a new beginning	As in Session 1, complete the "Draw a complete picture of yourself" activity and evaluate your drawing; take a moment to become aware of your essential self

K-MBSR = mindfulness-based stress reduction-Korean version, MBAT = mindfulness-based art therapy.

waitlisted control group not to receive or practice therapies such as meditation, yoga techniques, or interventions similar to MBAT in order to avoid potential contamination as a no treatment group. After the completion of this study, the subjects in the waitlisted control group received the same MBAT intervention as the experimental one.

### Measures

Patients used a self-report type evaluation method and evaluated themselves before and after treatment.

#### *State-Trait Anger Expression Inventory (STAXI)*

The STAXI provides a self-reported measure of the experience and expression of anger in 44 items.<sup>18</sup> Individuals answered on a 4-point Likert scale ("Not at all" to "Almost always") to assess either the intensity of their angry feelings or the frequency in which anger is experienced, expressed, or controlled.

#### *Beck Depression Inventory (BDI)*

The BDI is a 21-item questionnaire designed to assess the degree of depressive symptoms present over a 1-week period.<sup>19</sup> Each of the 21 items corresponding to a symptom of depression is summed to give a single score. There is a four-point scale for each item ranging from 0 to 3. Total score of 0–13 is considered minimal range, 14–19 is mild, 20–28 is moderate, and 29–63 is severe. We used the Korean version of the BDI.<sup>20</sup>

*Trait Anxiety Inventory (TAI)*

The TAI is a commonly used measure of trait anxiety.<sup>21</sup> The TAI defines how one feels in general. It has 20 items for assessing trait anxiety. Trait anxiety items include: “I worry too much over something that really does not matter” and “I am content; I am a steady person.” All items are rated on a 4-point scale (e.g., from “Almost never” to “Almost always”). Higher scores indicate greater anxiety.

**Statistical analysis**

According to intent-to-treat (ITT) principle, the data for all the subjects were analyzed. Both Student's t-test and  $\chi^2$  test were used for the analysis of demographic and clinical variables. Repeated measures of analysis of variance (ANOVA) were used to test both interaction and main effects of MBAT between the two groups. All the statistical analyses were conducted by IBM SPSS statistics 21.0 (SPSS Inc., Chicago, IL, USA).

**Ethics statement**

This study was received and approved by the Institutional Review Board of the Seoul National University Hospital (IRB No. B-1111/139-301). Written informed consent was obtained from all study participants.

**RESULTS**

**Pretest measures**

Demographic data and clinical traits are displayed in Tables 2 and 3. There were no significant differences between demographic traits and clinical variables.

**Homogeneity test of psychological variables between MBAT and control group**

The results showed no significant differences in subjects' psychological characteristics between the MBAT and control groups (Table 4).

**Results of comparison for mean difference scores at 12 weeks of MBAT for depression and trait anxiety**

The results of outcome measures in MBAT and control groups are shown in Table 5. Both depression and trait anxiety scores showed statistically significant decreases in the MBAT group. Two-way repeated measure ANOVA revealed significant effects for groups (MBAT group vs. control group), time (before and after a single week of the 12 weeks training), and

**Table 2.** Demographic characteristics of subjects

Variables	MBAT (n = 21)	CONT (n = 23)	t/ $\chi^2$	P value
Age, yr	64.81 ± 9.19	65.30 ± 7.12	0.663	0.627
Sex			2.257	0.133
Male	12 (40.0)	18 (60.0)		
Female	9 (64.3)	5 (35.7)		
Marital status			0.004	0.949
Single	1 (50.0)	1 (50.0)		
Married	20 (47.6)	22 (52.4)		
Job			1.428	0.232
Yes	12 (57.1)	9 (42.9)		
No	9 (39.1)	14 (60.9)		

Values are presented as mean ± SD or number (%).

SD = standard deviation, MBAT = mindfulness-based art therapy, CONT = healthy control group.

**Table 3.** Clinical characteristics of subjects

Variables		MBAT (n = 21)	CONT (n = 23)	t/ $\chi^2$	P value
<b>Physical symptoms</b>					
Duration of CAD, yr	< 1	2 (40.0)	3 (60.0)	3.283	0.193
	1–3	9 (37.5)	15 (62.5)		
	> 3	10 (66.7)	5 (33.3)		
History of MI	Yes	2 (33.3)	4 (66.7)	0.577	0.447
	No	19 (50.0)	19 (50.0)		
PCI	Yes	12 (57.1)	9 (42.9)	1.428	0.232
	No	9 (39.1)	14 (60.9)		
Revascularization	Yes	1 (50.0)	1 (50.0)	0.004	0.949
	No	20 (47.6)	22 (52.4)		
Congestive heart failure	Yes	0 (0.0)	1 (100.0)	0.934	0.333
	No	21 (48.8)	22 (51.2)		
History of stroke	Yes	0 (0.0)	1 (100.0)	0.934	0.333
	No	21 (48.8)	22 (51.2)		
Family history of CAD	Yes	14 (45.2)	17 (54.8)	0.277	0.598
	No	7 (53.8)	6 (46.2)		
Hypercholesterolemia	Yes	17 (53.1)	15 (46.9)	1.370	0.241
	No	4 (33.3)	8 (66.7)		
Hypertension	Yes	18 (50.0)	18 (50.0)	0.410	0.521
	No	3 (37.5)	5 (62.5)		
Diabetes mellitus	Yes	4 (44.4)	5 (55.6)	0.049	0.824
	No	17 (48.6)	18 (51.4)		
<b>Smoking</b>				1.428	0.489
Smoker		6 (42.8)	8 (57.2)		
Non-smoker		7 (53.8)	6 (46.2)		
Ex-smoker		8 (47.1)	9 (52.9)		
<b>Alcohol use</b>				0.820	0.365
Yes		9 (40.9)	13 (59.1)		
No		12 (54.5)	10 (45.5)		
<b>Risk factors of CAD</b>					
Cholesterol, mg/dL		167.52 ± 31.47	160.96 ± 33.98	0.663	0.627
Low-density lipoprotein, mg/dL		95.00 ± 24.72	87.00 ± 25.33	1.058	0.482
High-density lipoprotein, mg/dL		52.67 ± 12.44	52.57 ± 14.54	0.025	0.984
Triglyceride, mg/dL		117.86 ± 75.85	130.87 ± 60.09	-0.634	0.640
Serum creatinine, mg/dL		0.90 ± 0.21	0.97 ± 0.21	-1.167	0.451
Systolic blood pressure, mmHg		131.14 ± 12.13	126.26 ± 7.07	1.649	0.347
Diastolic blood pressure, mmHg		78.81 ± 8.95	79.48 ± 5.19	-0.306	0.811

Values are presented as mean ± SD or number (%).

SD = standard deviation, MBAT = mindfulness-based art therapy, CONT = healthy control group, CAD = coronary artery disease, PCI = percutaneous coronary intervention, MI = myocardial infarction.

**Table 4.** Homogeneity test of psychological variables between MBAT and control group

Dependent variable groups	MBAT (n = 21)	CONT (n = 23)	t	P value
Depression	16.93 ± 9.52	14.73 ± 6.57	0.84	0.555
Trait anxiety	48.33 ± 7.42	43.73 ± 8.76	1.67	0.343
<b>Type of anger</b>				
State anger	13.73 ± 4.83	11.18 ± 1.76	1.96	0.300
Trait anger	16.51 ± 3.51	17.87 ± 3.73	-1.83	0.318
<b>Anger expression</b>				
Anger in	13.67 ± 4.08	13.45 ± 3.50	0.16	0.898
Anger out	12.13 ± 3.85	12.09 ± 2.96	0.04	0.974
Anger control	16.40 ± 4.87	19.36 ± 5.72	-1.64	0.348

Values are presented as mean ± SD.

SD = standard deviation, MBAT = mindfulness-based art therapy, CONT = control group.

interaction (group × time) in the depression (interaction effect, [ $F(1,36) = 23.15, P < 0.001$ ]; between group, [ $F(1,36) = 5.73, P = 0.022$ ]), trait anxiety (interaction effect, [ $F(1,36) = 13.23, P < 0.001$ ]; between group, [ $F(1,36) = 4.38, P = 0.043$ ]).

**Table 5.** Results of comparison for mean difference scores at 12 weeks of MBAT for depression and trait anxiety

Dependent variable groups	Mean ± SD		Group	F	
	Pre	Post		Time	Group × Time
Depression			5.73 <sup>a</sup>	2.21	23.15 <sup>b</sup>
MBAT	16.93 ± 9.52	6.60 ± 3.56			
CONT	14.73 ± 6.57	20.18 ± 11.66			
Trait anxiety			4.38 <sup>a</sup>	1.16	13.23 <sup>b</sup>
MBAT	16.51 ± 3.51	9.56 ± 4.31			
CONT	17.87 ± 3.73	18.58 ± 5.32			

SD = standard deviation, MBAT = mindfulness-based art therapy, CONT = control group.  
<sup>a</sup>*P* < 0.05, <sup>b</sup>*P* < 0.001.

**Table 6.** Results of comparison for mean difference scores at 12 weeks of MBAT for state anger and trait anger

Dependent variable groups	Mean ± SD		Group	F	
	Pre	Post		Time	Group × Time
State anger			1.76	1.76	5.60 <sup>a</sup>
MBAT	13.73 ± 4.83	11.80 ± 3.39			
CONT	11.18 ± 1.76	11.73 ± 3.31			
Trait anger			1.12	4.73 <sup>a</sup>	6.93 <sup>a</sup>
MBAT	21.67 ± 5.45	18.80 ± 3.08			
CONT	18.73 ± 4.30	19.00 ± 3.98			

SD = standard deviation, MBAT = mindfulness-based art therapy, CONT = control group.  
<sup>a</sup>*P* < 0.05

### Results of comparison for mean difference scores at 12 weeks of MBAT for state anger and trait anger

The results of outcome measures in MBAT and control groups are shown in **Table 6**. Both state anger and trait anger scores showed statistically significant decreases in the MBAT group. Two-way repeated measure ANOVA revealed significant effects for groups (MBAT group vs. control group), time (before and after a single week of the 12 weeks training), and interaction (group × time) in the state anger (interaction effect, [*F*(1,36) = 5.60, *P* = 0.023], trait anger (interaction effect, [*F*(1,36) = 6.93, *P* = 0.012]; within group, [*F*(1,36) = 4.73, *P* = 0.036]).

### Results of comparison for mean difference scores at 12 weeks of MBAT for anger control, anger out and anger in

The results of outcome measures in MBAT and control groups are shown in **Table 7**. Although anger out and anger in decreased, anger control showed a statistically significant increase in the MBAT group. Two-way repeated measure ANOVA revealed significant effects for groups (MBAT group vs. control group), time (before and after a single week of the 12 weeks training), and interaction (group × time) in the anger control (interaction effect, [*F*(1,36) = 8.41, *P* = 0.006]; within group, [*F*(1,36) = 9.41, *P* = 0.004]), anger out (interaction

**Table 7.** Results of comparison for mean difference scores at 12 weeks of MBAT for anger control, anger out and anger in

Dependent variable groups	Mean ± SD		Group	F	
	Pre	Post		Time	Group × Time
Anger control			0.15	9.41 <sup>b</sup>	8.41 <sup>b</sup>
MBAT	16.40 ± 4.87	21.27 ± 5.99			
CONT	19.36 ± 5.72	19.50 ± 4.48			
Anger out			5.62 <sup>a</sup>	13.17 <sup>c</sup>	6.88 <sup>a</sup>
MBAT	12.13 ± 3.85	7.33 ± 3.60			
CONT	12.09 ± 2.96	11.32 ± 3.29			
Anger in			12.44 <sup>c</sup>	25.90 <sup>c</sup>	32.66 <sup>c</sup>
MBAT	13.67 ± 4.08	6.60 ± 3.14			
CONT	13.45 ± 3.50	13.86 ± 3.54			

SD = standard deviation, MBAT = mindfulness-based art therapy, CONT = control group.  
<sup>a</sup>*P* < 0.05, <sup>b</sup>*P* < 0.01, <sup>c</sup>*P* < 0.001.

effect, [ $F(1,36) = 6.88, P = 0.012$ ]; within group, [ $F(1,36) = 13.17, P < 0.001$ ]; between groups, [ $F(1,36) = 5.62, P = 0.023$ ]), and anger in (interaction effect, [ $F(1,36) = 32.66, P < 0.001$ ]; within group, [ $F(1,36) = 25.90, P < 0.001$ ]; between groups, [ $F(1,36) = 12.44, P < 0.001$ ]).

## DISCUSSION

The incidence of CAD rises every year, leading to higher mortality rates. Psychological factors have a significant effect on the progress and prognosis of CAD, and in that sense, proper psychological intervention is required. Our study aimed to investigate the effects of MBAT on reducing depression, anxiety, anger, and anger expression among CAD patients.

The MBAT group showed a significant decrease in depression and trait anxiety. A few other studies found the effectiveness of this therapy in CAD patients as well. Abbott et al.<sup>22</sup> found that CAD patients showed reduced depression and perceived stress with the help of MBAT. In a recent study by Nyklíček et al.,<sup>23</sup> those who recently experienced percutaneous coronary intervention had their anxiety, depression, and stress levels decreased after receiving MBAT for a short period of time. Parswani et al.<sup>24</sup> also found that MBSR training significantly reduced blood pressure and body mass index, both physiological parameters, as well as anxiety, depression, and perceived stress levels in CAD patients. Based on these findings, the MBAT might help improve awareness of the moment, cognitive processes, and information processing by focusing attention on the breath and being in the present moment.<sup>25</sup> In addition, this method might allow patients to simply approach their emotions and aim to understand and apply them, rather than driving away unwanted emotions through mindfulness meditation.<sup>13</sup> Thus, rather than changing something that exists, mindfulness is a technique that allows people to approach it and understand, experience, and describe it. MBAT also combines traditional, psychological, and relaxation techniques that induce relaxation, which in turn decreases autonomic nervous system (ANS) reactivity.<sup>26</sup>

This therapy not only helps patients to practice relaxation, but also offers additional measures to help them reach a relaxed state. It induces changes in essential physiological factors that are easily affected by emotions, such as breathing synchrony and heart rate, and also boosts satisfaction among patients through physical integration. Some other studies found that the development of acceptance and self-compassion could produce beneficial outcomes from the positive effects of the therapy on depression and anxiety.<sup>27</sup> When patients show minor symptoms of depression, MBAT should be applied as a mental health intervention to prevent it from progressing into major depressive disorder.<sup>28</sup>

Our study also found that after MBAT, CAD patients saw their state and trait aggression reduce significantly. The therapy was effective in reducing anger expression, particularly anger-control, anger-out, and anger-in. In previous studies, such as Chilvers et al.,<sup>29</sup> MBAT improved hostility. Rodriguez et al.<sup>30</sup> showed that the therapy might help improve control over trait anger. In a study by Younge et al.,<sup>31</sup> mindfulness training had a positive effect on physiological parameters, including exercise capacity and heart rate, and could serve as an effective clinical therapy for heart disease patients. Further, MBAT helps patients with concentration, non-judgment, and acceptance, and also helps them live in the present. It provides a technique that can alter cognition, helping patients see their anger as merely a temporary shift of emotion, not as consequences of certain behaviors. By doing that, the



therapy seems to improve patients' self-control. With it, patients can execute a more adaptive response to deal with their anger, rather than approaching it with aggression.

The limitations of this research are that the number of subjects studied is small, and the study was conducted during a limited 12-week period. Second, self-reported surveys were used to make evaluations and it was possible that researcher supervision intervened during the study. Third, probable errors caused by demographic variables, status of CAD, or treatment methods also cannot be excluded. Fourth, the fact that there have been more frequent visits to the MBAT group than the control group may have worked as a bias in judging the treatment effect. Fifth, the study showed higher dropout rates in the control group, and the primary cause for this was found to be the lack of motivation for treatment. This fact could also have triggered a bias in analyzing the treatment effect. Furthermore, as the number of subjects is small, large standard deviations were obtained.

However, this research is significant in that it is the first study to evaluate the effects of MBAT on CAD patients. In addition, previous studies observed patients who had received treatment for a significant period before the study. This research looked at patients who had recently received treatment to verify the effect of MBAT. Lastly, patients were able to learn techniques to adapt to their illness and improve psychological well-being. Future studies will need to observe a larger number of patients to evaluate the effects of MBAT and observe ways to clinically apply MBAT.

## REFERENCES

1. Korean Statistical Information Service. <http://kosis.kr/>. Updated 2016. Accessed August 27, 2016.
2. Lim ST. Assessment of prognosis and risk stratification in coronary artery disease. *Nucl Med Mol Imaging* 2009;43(3):222-8.
3. Kohli P, Whelton SP, Hsu S, Yancy CW, Stone NJ, Chrispin J, et al. Clinician's guide to the updated ABCs of cardiovascular disease prevention. *J Am Heart Assoc* 2014;3(5):e001098.  
[PUBMED](#) | [CROSSREF](#)
4. Everson-Rose SA, Lewis TT. Psychosocial factors and cardiovascular diseases. *Annu Rev Public Health* 2005;26(1):469-500.  
[PUBMED](#) | [CROSSREF](#)
5. Low CA, Thurston RC, Matthews KA. Psychosocial factors in the development of heart disease in women: current research and future directions. *Psychosom Med* 2010;72(9):842-54.  
[PUBMED](#) | [CROSSREF](#)
6. Davidson KW. Depression and coronary heart disease. *ISRN Cardiol* 2012;2012:743813.  
[PUBMED](#) | [CROSSREF](#)
7. Allgulander C. Anxiety as a risk factor in cardiovascular disease. *Curr Opin Psychiatry* 2016;29(1):13-7.  
[PUBMED](#) | [CROSSREF](#)
8. Pimple P, Shah A, Rooks C, Bremner JD, Nye J, Ibeanu I, et al. Association between anger and mental stress-induced myocardial ischemia. *Am Heart J* 2015;169(1):115-121.e2.  
[PUBMED](#) | [CROSSREF](#)
9. Chida Y, Steptoe A. The association of anger and hostility with future coronary heart disease: a meta-analytic review of prospective evidence. *J Am Coll Cardiol* 2009;53(11):936-46.  
[PUBMED](#) | [CROSSREF](#)
10. Brydon L, Strike PC, Bhattacharyya MR, Whitehead DL, McEwan J, Zachary I, et al. Hostility and physiological responses to laboratory stress in acute coronary syndrome patients. *J Psychosom Res* 2010;68(2):109-16.  
[PUBMED](#) | [CROSSREF](#)
11. Denollet J, Gidron Y, Vrints CJ, Conraads VM. Anger, suppressed anger, and risk of adverse events in patients with coronary artery disease. *Am J Cardiol* 2010;105(11):1555-60.  
[PUBMED](#) | [CROSSREF](#)

12. Buckley T, Hoo SY, Fethney J, Shaw E, Hanson PS, Tofler GH. Triggering of acute coronary occlusion by episodes of anger. *Eur Heart J Acute Cardiovasc Care* 2015;4(6):493-8.  
[PUBMED](#) | [CROSSREF](#)
13. Kabat-Zinn J. Mindfulness-based interventions in context: past, present, and future. *Clin Psychol (New York)* 2003;10(2):144-56.  
[CROSSREF](#)
14. Monti DA, Peterson C, Kunkel EJ, Hauck WW, Pequignot E, Rhodes L, et al. A randomized, controlled trial of mindfulness-based art therapy (MBAT) for women with cancer. *Psychooncology* 2006;15(5):363-73.  
[PUBMED](#) | [CROSSREF](#)
15. Leventhal H, Diefenbach M, Leventhal EA. Illness cognition: using common sense to understand treatment adherence and affect cognitions interactions. *Cognit Ther Res* 1992;16(2):143-63.  
[CROSSREF](#)
16. Morey LC. *The Personality Assessment Inventory*. Odessa, FL: Psychological Assessment Resources; 1991.
17. Chang HK. Therapeutic application of meditation to the stress-related disorders. *Korean J Health Psychol* 2004;9(2):471-92.
18. Spielberger CD. *State-Trait Anger Expression Inventory Professional Manual*. Odessa, FL: Psychological Assessment Resources; 1988.
19. Beck AT, Ward CH, Mendelson M, Mock J, Erbaugh J. An inventory for measuring depression. *Arch Gen Psychiatry* 1961;4(6):561-71.  
[PUBMED](#) | [CROSSREF](#)
20. Han HM, Yum TH, Shin YW, Kim KH, Yoon DJ, Chung KJ. A standardization study of Beck depression inventory in Korea. *J Korean Neuropsychiatr Assoc* 1986;25(3):487-500.
21. Spielberger CD, Gorsuch RL, Lushene RE. *STAI Manual for the State-trait anxiety inventory: (Self-evaluation Questionnaire)*. Palo Alto, CA: Consulting Psychologists Press; 1970.
22. Abbott RA, Whear R, Rodgers LR, Bethel A, Thompson Coon J, Kuyken W, et al. Effectiveness of mindfulness-based stress reduction and mindfulness based cognitive therapy in vascular disease: a systematic review and meta-analysis of randomised controlled trials. *J Psychosom Res* 2014;76(5):341-51.  
[PUBMED](#) | [CROSSREF](#)
23. Nyklíček I, Dijkstra SC, Lenders PJ, Fonteijn WA, Koolen JJ. A brief mindfulness based intervention for increase in emotional well-being and quality of life in percutaneous coronary intervention (PCI) patients: the MindfulHeart randomized controlled trial. *J Behav Med* 2014;37(1):135-44.  
[PUBMED](#) | [CROSSREF](#)
24. Parswani MJ, Sharma MP, Iyengar S. Mindfulness-based stress reduction program in coronary heart disease: a randomized control trial. *Int J Yoga* 2013;6(2):111-7.  
[PUBMED](#) | [CROSSREF](#)
25. Ockene JK, Ockene IS, Kabat-Zinn J, Greene HL, Frid D. Teaching risk-factor counseling skills to medical students, house staff, and fellows. *Am J Prev Med* 1990;6(2 Suppl):35-42.  
[PUBMED](#)
26. Davidson RJ, Kabat-Zinn J, Schumacher J, Rosenkranz M, Muller D, Santorelli SF, et al. Alterations in brain and immune function produced by mindfulness meditation. *Psychosom Med* 2003;65(4):564-70.  
[PUBMED](#) | [CROSSREF](#)
27. Kuyken W, Watkins E, Holden E, White K, Taylor RS, Byford S, et al. How does mindfulness-based cognitive therapy work? *Behav Res Ther* 2010;48(11):1105-12.  
[PUBMED](#) | [CROSSREF](#)
28. Cuijpers P, Smit F. Subthreshold depression as a risk indicator for major depressive disorder: a systematic review of prospective studies. *Acta Psychiatr Scand* 2004;109(5):325-31.  
[PUBMED](#) | [CROSSREF](#)
29. Chilvers J, Thomas C, Stanbury A. The impact of a ward-based mindfulness programme on recorded aggression in a medium secure facility for women with learning disabilities. *J Learn Disabil Offend Behav* 2011;2(1):27-41.  
[CROSSREF](#)
30. Rodriguez Vega B, Melero-Llorente J, Bayon Perez C, Cebolla S, Mira J, Valverde C, et al. Impact of mindfulness training on attentional control and anger regulation processes for psychotherapists in training. *Psychother Res* 2014;24(2):202-13.  
[PUBMED](#) | [CROSSREF](#)
31. Younger JO, Wery MF, Gotink RA, Utens EM, Michels M, Rizopoulos D, et al. Web-based mindfulness intervention in heart disease: a randomized controlled trial. *PLoS One* 2015;10(12):e0143843.  
[PUBMED](#) | [CROSSREF](#)