

Effectiveness of Acceptance and Commitment Therapy on Depression, Anxiety and Cessation in Marijuana Use Disorder: A Randomized Clinical Trial

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Abstract

Introduction: This study aimed to investigate the effectiveness of Acceptance and Commitment Therapy (ACT) on Marijuana Use Disorder (MUD) comorbid anxiety and depression symptoms and cessation.

Method: Fifty MUD patients were selected. The patients were randomly divided into interventional and control groups. The experimental group was treated with 12 weekly sessions of the ACT, and the control group received psycho education with the same duration. The tools used in this study included the Beck Depression Inventory (BDI), Beck Anxiety Inventory (BAI) and the marijuana abstinence urine kit. Data were analyzed with SPSS (V.26).

Results: Abstinence rates in the ACT group compared to the control at the post-test (65% vs. 25%), and at the follow-up period (55% vs. 15%) showed higher effectiveness for ACT ($P < 0.05$). Also, among those who had lapsed, participations in the ACT group had fewer days than the control group about marijuana consuming ($p < 0.05$). In the post-test and follow-up, anxiety and depression scores and abstinence rates in the ACT were respectively lower and higher compared to the control group ($P < 0.05$).

Conclusion: ACT can lead to lower consuming rates and a higher cessation rate in the MUD. It can also improve psychiatric symptoms in these patients.

Keywords: Depression, Anxiety, Acceptance and Commitment Therapy, Marijuana

Introduction

Marijuana, as one of the unauthorized drugs, is accompanied by significant physical, psychological, and social consequences [1]. According to the World Health Organizations (WHO) reports, more than 140 million people every year consume marijuana [2]. In regards to Iran, recent evidence showed that more than 5% of people, especially young men, consume marijuana every year. However, based on harsh illegalization policies of the Iranian government about marijuana, most of the clinicians estimated these rates had been hugely underestimated [3]. Also, about 33% of marijuana users have met the criteria for MUD, and the proportion is growing increasingly [4]. So efforts for treating marijuana smoking is a necessary step in public health.

The cessation rates remain low despite extensive efforts for harm reduction and cessation in marijuana users [5, 6]. Previous research showed that failure to treat (or even reduce)

comorbid psychological problems in addictive behaviors is one of the leading causes responsible for these low rates of cessation [7, 8]. Studies have shown that chronic and heavy marijuana use can lead to symptoms of depression. Reversely, depression also causes and even exacerbates marijuana use [9]. Besides, marijuana dependence causes episodes of major depression during a lifetime by 3-4 times. It can only be the symptoms of depression or the major one. However, depression may reduce the ability to quit in people [10-12]. Chronic cannabis and marijuana users, on the other hand, exhibit much higher levels of anxiety rather than non-users [13]. These symptoms can range from an anxiety disorder, especially panic, to several clinical symptoms without an anxiety disorder. However, anxiety in each part of this spectrum will lead to a decrease in socio-occupational-academic performance and then impeding for cessation efforts [14].

In recent years, the most common treatment for addictive behaviors has been cognitive-behavioral therapy, and research has shown that this treatment is more effective than the 12-step programs and other forms of psychotherapies [8]. However, studies show that cognitive change is not always a useful strategy, and in many cases, patients are unable to correct their impaired cognition. Also, cognitive behavioral therapy is not a cure for comorbid disorders. It is impossible to treat depression, anxiety, and cessation by a single cognitive-behavioral protocol [15]. In recent years, the number of drug users seeking treatment has doubled compared to previous decades, and this is why more effective therapies are needed in this area [1].

ACT, as a trans-diagnostic approach in recent years, has paid particular attention to improving behavioral problems, including addictive behaviors (1, 14). This therapy's commitment is mindfulness and focusing on changing individual relationships with subjective experience rather than a direct change of these experiences. It seeks to enable more significant adaptation, flexibility, and value-based practice [8, 16]. Studies have shown the efficacy of this treatment in treating depression and anxiety (11, 16). However, results in other addictive behaviors are conflicting [17]. There is only one study on its effectiveness on marijuana users that has limitations such as a small sample size (only three individuals), which causes lack of generalization. It does not match marijuana use disorder with DSM diagnostic criteria and does not have standard diagnostic criteria, so there is a high possibility of severity interference and even misdiagnosis [1]. Therefore, in this study, the effectiveness of ACT on anxiety, comorbid depression, and cessation in people with MUD in a clinical trial is examined.

Method

The present study was a randomized controlled trial that included a pre-test, post-test, and three-month follow-up stages. The intervention was parallel in both groups and was performed simultaneously.

Participants included those diagnosed according to the criteria of cannabis (marijuana) use disorder who referred

to the clinics affiliated to the Kermanshah University of Medical Sciences.

The inclusion criteria included being 18 to 45 years of age, a score of at least 13 on the Beck Depression and Anxiety questionnaire, a minimum educational degree of secondary-school diploma, a MUD diagnostic according to DSM-5, no depression and anxiety due to personal problems like divorce and death, no other psychiatric disorders based on DSM-5, no history of psychiatric disorders, not taking psychotherapy in the past six months, and at least a score of 13 in the anxiety and depression scale.

The exclusion criteria included unwillingness to continue the sessions, absence of more than one session, starting medication or secondary psychotherapy, and discovering the use of other drugs during the intervention and follow-up stages of the research.

According to similar studies, with a confidence level of 95%, type two error of 20%, the sample size was calculated to be 18 individuals in each group. Due to the long period of follow up, the sample size was considered to be 25 individuals, so the exclusion of the subjects in the case of no bias would not cause any problem.

$$n = \frac{(Z_{1-\alpha/2} + Z_{1-\beta})^2 (SD_1 + SD_2)^2}{d^2}$$

Due to the absence of a cannabis disorder treatment center in Iran, there was no specific place to select volunteers. On the other hand, people in drug treatment centers referred for treating other drugs use disorders; and comorbidity of drug use is among the exclusion criteria in this study. Therefore, the families and acquaintances of those who had referred to a drug treatment center were interviewed. From the first of November 2019, to the 10th of November 2019, out of the 109 relatives and families of drug users referred to drug treatment centers, eight were diagnosed with marijuana cannabis use disorder. Then, by using snowball sampling, after 15 days of investigation, 50 individuals were diagnosed with cannabis (marijuana) use. These participants were randomly assigned to the ACT or control group with a random number table. From the first of December 2019, to the first of March 2020, interventions were implemented. The follow-up phase started on the first of March 2020, and ended on the first of June 2020, (three-month follow-up). To exclude dual substance users before every session, a six-drug urine kit for Methadone, Benzodiazepines, Amphetamine, Methamphetamine, Morphine, and Cannabis was administered.

The experimental group received 12 sessions of ACT based on combination of Turner and davoudi protocols of ACT on addiction [8, 18]. ACT sessions (Table 1) were conducted by two psychologist experts in mindfulness treatments in substance abuse.

According to the treatment protocol established by the Ministry of Health of Iran for 12 weekly sessions as psycho-education about substance use, the control group received routine psychological counseling at the treatment centers. This is a leader focused intervention with a high level of facilitator activity. This protocol

provides information intended to have direct applicability to patients' lives to teach self-awareness, recognize community resources that can support patients in recovery, recommend opportunities for development and change and promote knowledge about the process of recovery. Facilitators inform patients about psychological

issues such as depression and anxiety. Also, they learn how to manage unpleasant states. The main goal of psychoeducational groups is to expand knowledge about the behavioral, psychological, and medical outcomes of substance abuse. Another primary goal is to motivate the patients to reenter the recovery-ready stage [19, 20].

Table 1. Content of ACT

Session	Content
Pre-Session and Preparation	Introducing the Basics of Treatment: Familiarity with group members and establishing the therapeutic relationship, defining the rules of treatment sessions and discussing confidentiality, therapeutic relationship stipulation, introduction, and evaluation of research variables, and description of treatment approach. Replying to basic questions and identifying obstacles. Collaborating to find solutions to potential barriers to participation in treatment.
Session 1	Acceptance and commitment therapy is introduced. The values and obstacles along the path of quitting smoking are explained. Using the metaphor of the man in the pit as well as the metaphor of driving with the rear view mirror of the car, the way of avoidance and focus on the use or non-use of the tools in life is specified. The concept of creative helplessness can also be explained to the group through the above-mentioned metaphors. At the end of the session, patients are also asked to do homework on avoidance, etc.
Session 2	In the second session, control versus desire is discussed. The concept of acceptance and the amount of energy and power that has been used previously just for avoidance and its disadvantages are discussed. Then there is a group discussion about creative helplessness and disability. Also, the tug of war with a monster metaphor is introduced as well as cleans versus dirty discomfort. In this session, the relationship between anxiety and stress is discussed as the emotion regulation problems in relapse and relapse.
Sessions 3-5	The homework is reviewed, and a 15-minute of talking is done on reviewing achievements and assignments. Introducing the thought-action fusion and its weaknesses. Performing and explaining the twist task. This exercise is taught to get rid of the intrusive thoughts and their impact on life. Introducing the relationship between emotional regulation problems with temptation and relapse. Training meditation on this task as well as a detailed talk on the values, goals, and barriers to stop drug. Explaining the skiing metaphor and the hazelnut metaphor in order to teach the goals and the way to achieve them.
Sessions 6-7	In these two sessions, mindfulness, rehearsal, and body scan training are performed. Risky decision-making is introduced. Impulsivity and its relation to lack of mindfulness are also explained. Introducing the relationship between emotional regulation problems and temptation and relapse. Performing mindfulness exercises in relation to temptation and depression and anxiety.
Sessions 8-10	Explaining the way of planning and problem solving work and describing the fact that these thoughts cannot make change unless planning, thinking and consulting does not happen. Teaching the selection of goals and their relation to values.
Sessions 11-12	Reviewing previous sessions, briefly describing and explaining tips. Patients are asked to act as a therapist to other people and perform the intervention for others and themselves in cooperation with therapist. Finally, individuals are encouraged to review their treatment plans and to prepare short-term, mid-term, and long-term goals for themselves after completion of treatment. At this stage, the therapist will assist them in this task.

In order to avoid the inclusion of multi-drug individuals and to prevent its influence on results, each week, and prior to the session, a six-pack of six-drug kits for methamphetamine, amphetamine, cannabis, methadone, benzodiazepines, and morphine was administered to individuals through urine.

This was only performed three times during the follow-up due to material problems in conducting the research and weekly inaccessibility during the follow-up period.

The marijuana urine test kit (Kian-Teb, IRAN) was used to identify the quitting.

The tools used in this study were as follows:

Beck Anxiety Questionnaire (BDI): The BDI is a 21-item scale developed by Beck in 1988. Examining its psychometric status showed 0.82 internal consistencies, and has proven to be a good tool for measuring anxiety. In Iran, this questionnaire has high reliability and validity. The internal consistency (Alpha=0.92), reliability ($r=0.72$)

and validity ($r=0.83$) are in excellent measures [21].

Beck Depression Questionnaire: This questionnaire, consisting of 21-items, was designed to measure feedback and symptoms of depression. Validity coefficients ranged from 0.48 to 0.86. In Iranian culture-related studies, the validity of this questionnaire was reported to be high (varied from 0.70 to 0.90) [22].

Marijuana smoking: The urine kit was used for assessing marijuana in urine. This laboratory test was used in pretest, post-test and follow-up.

Demographic information including frequency, mean, standard deviation and repeated measures ANOVA test were done by SPSS (version 26).

Results

During the intervention, one person in the control group could not continue the sessions because of a severe physical illness. In addition, in the intervention group, the

opioid use test was positive in one of the subjects and was therefore excluded from the study. Results were reported on only 40 patients in the research steps (Figure1).

Demographic and research variables in participants are shown in Table 1. There was no significant difference between the two groups regarding these variables.

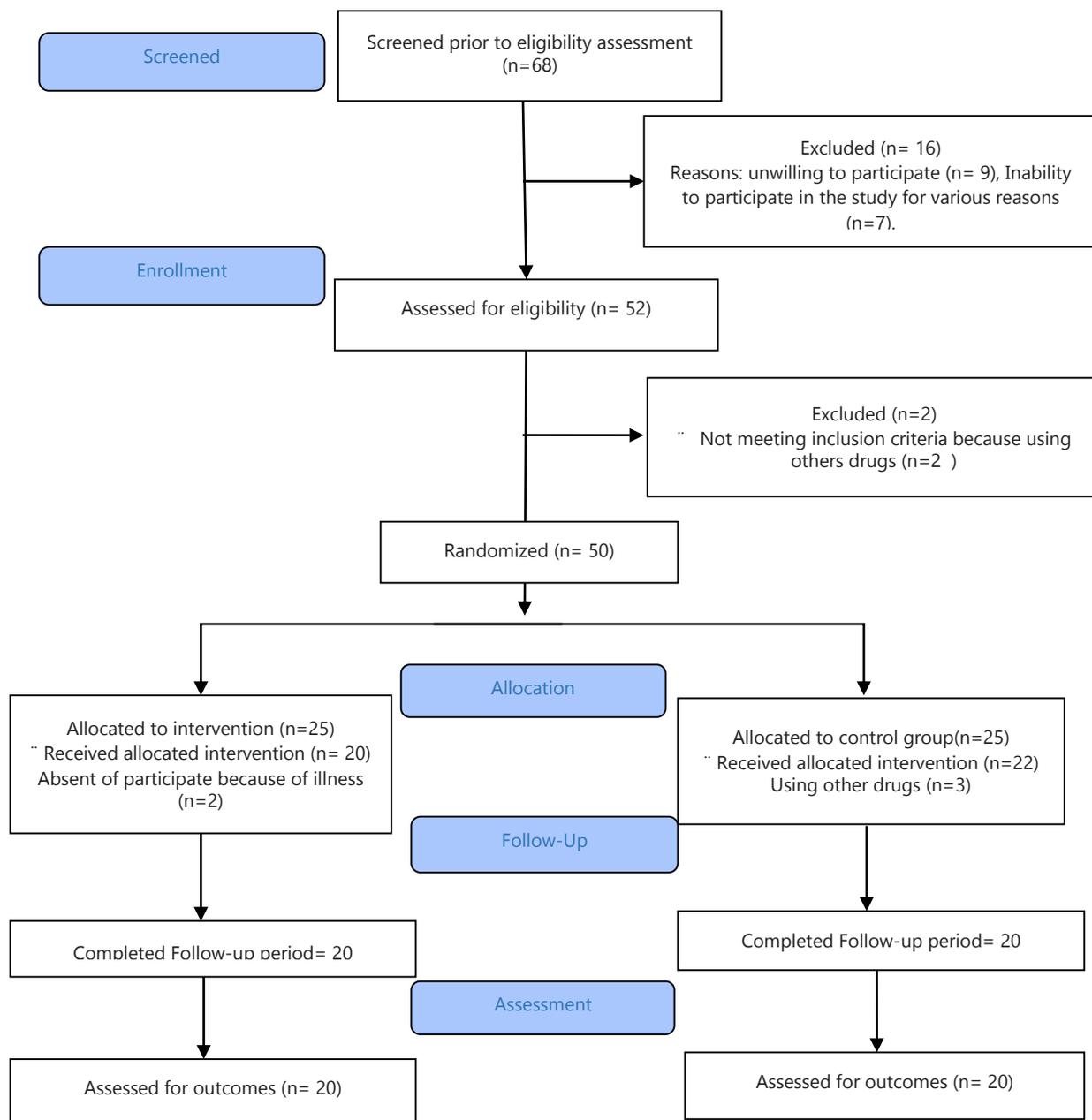


Figure 1. The consort flowchart

Table 1. Mean and Standard Deviation of Demographic Variables in Intervention and Control Groups

Variable	Intervention group Mean (SD)	Control Group Mean (SD)	P
Educational Level ^s	Under diploma ^a	2(10%)	0.74
	Diploma ^a	9(45%)	
	University student or graduate ^a	9(45%)	
Age	26.8(5.3)	24.9(4.6)	0.26
Months of Using	22.7(7.56)	24.7(6.07)	0.35
Anxiety	Pre-test	21.75(6.2)	0.459
	Post-test	15.45(5.13)	
	Follow-up	15.9(5.04)	
Depression	Pre-test	22.3(5.9)	0.54
	Post-test	17.35(4.6)	
	Follow-up	16.3(4.8)	
		20.3(5.9)	0.023

a: Data are expressed as N%. b: Independent t-test was used. c: The chi-square test was applied.

Repeated measure ANOVA was used to evaluate the mean scores of the two groups at three time points. For this purpose, the covariance matrices equality hypothesis was examined (Box's M = 5.74, P = 0.51). Results of this test suggested homogeneity in the covariance matrices. Mauchly's

test of sphericity also showed the establishment of the sphericity assumption (p = 0.17 and Mauchly's W = 0.9). The effect level (F = 10.11) suggests the significant effectiveness of the intervention group compared to the control group (p <0.05) (Table 2, Figure 2).

Table 2. Repeated Measures ANOVA for Variables between ACT Group and Control Group in Pre-test, Post-test and Follow-up

Variable	Source	Type III Sum of Squares	df	Mean Square	F	P	Partial Eta Squared	Observed Power ^a	
anxiety	Tests of Within-Subjects Effects	factor1	183.01	1	183.01	6.81	0.013	0.15	0.72
		Factor1*group	40.61	1	40.61	1.51	0.226	0.03	0.22
		Error(factor1)	1020.87	38	26.86				
anxiety	Tests of Between-Subjects Effects	Group	310.40	1	310.40	10.11	0.003	0.21	0.87
		Error	1166.25	38	30.69				
Depression	Tests of Within-Subjects Effects	Factor1	234.61	1	234.61	8.28	0.007	0.17	0.80
		Factor1*group	43.51	1	43.51	1.53	0.503	0.01	0.22
		Error(factor1)	1076.37	38	28.32				
Depression	Tests of Between-Subjects Effects	Group	267.00	1	267.00	12.2	0.001	0.24	0.92
		Error	1195.30	38	31.45				

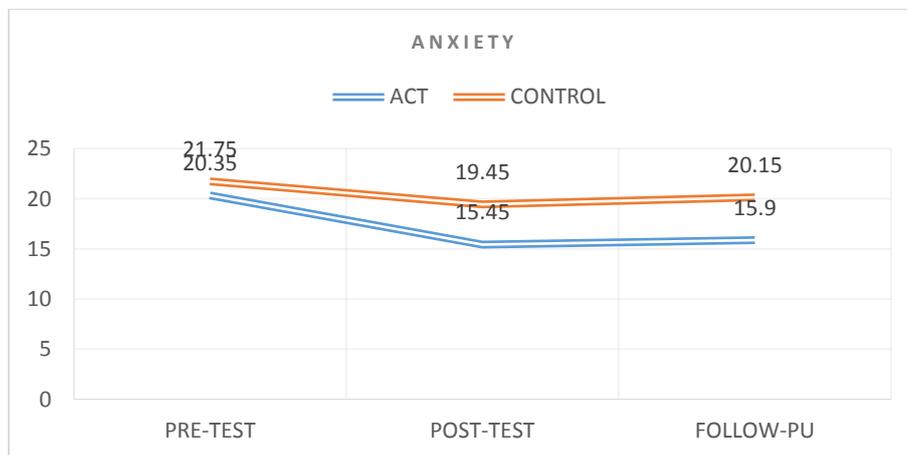


Figure 2. Comparison mean scores of anxiety between ACT group and control group in the pre-test, post-test and follow-up.

Depression

Repeated measure ANOVA was used to evaluate the mean depression scores of the two groups at three time points. For this purpose, the covariance matrices equality hypothesis was examined (Box's M = 1.31, P = 0.98). Results of test suggest the covariance matrices equality (p

<0.05). Mauchly's test of sphericity also showed establishment of sphericity assumption (p = 0.56 and Mauchly's W = 0.97). The effect level (F = 12.2) suggests the significant effectiveness of the intervention group compared to the control group (p <0.05) (Table 2, Figure 2).

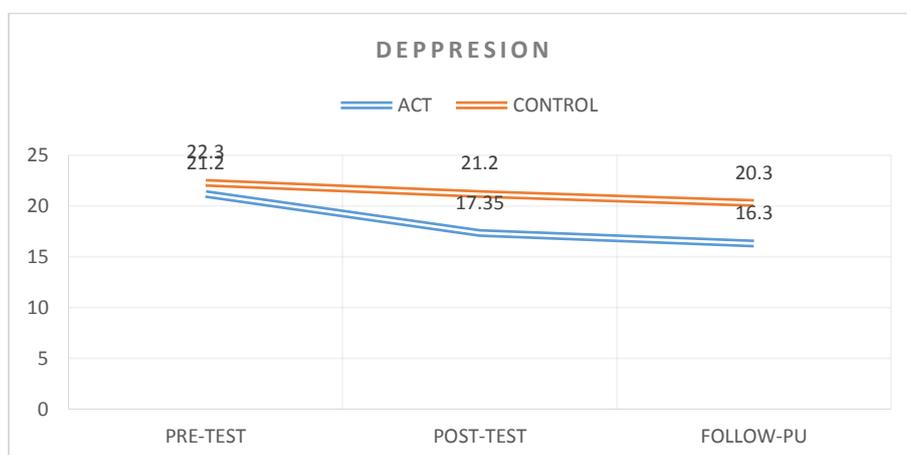


Figure 3. Mean scores of depression

About quitting, the results indicated that the subjects with ACT had a higher rate of quitting than the control treatment. It was also found that among those who continued to use the drug, the

number of monthly use days in the post-test follow-up (three months) were significantly lower in the intervention group compared to the control group (Table3).

Table 3. Cessation and Consumption between Groups

		ACT	Control	P
Cessation ^c	Post-test	13	5	0.025*
	Follow-up	11	3	0.019*
Number of days use ^b	post-test	4.71(1.61)	10.53(3.27)	0.001*
	Follow-up	6(2.44)	8.35(2.2)	0.02*

b: Independent t-test was used. c: The chi-square test was applied

Discussion

The present study showed that ACT had a significant effectiveness in improving marijuana use disorder, comorbid depression and anxiety. Since the present study is one of the first studies to evaluate the effectiveness of ACT on marijuana use and comorbid psychological problems, there is little research background. However, current the research is in line with the results of previous studies. In a previous research, the effectiveness of ACT on adults with marijuana addiction was examined on three patients. The results showed that one person was still abstinent after three months in follow-up, and two others reported lower levels of use. The limitations of the mentioned study were the minimal sample size and the use of self-reporting to quit or reduce drug use that has been eliminated in the present study [13].

In the case of marijuana cessation, this treatment also teaches people to identify internal and external triggers. The next step is to accept emotional states, such as craving and anxiety about not using the drug. In previous treatments, people learned to control emotions resulting from the habit of using the term. Excessive control produced unpleasant emotional states such as anxiety, distress, and mood disorders, which stimulated the individual to use drugs. In this treatment, people learn that these emotions are not stable, and by recognizing them, rather than controlling, they will try to accept them. This acceptance makes people merely experience these states without judging until they are needed, rather than showing quick reactions based on these states [23]. Therefore, relapse does not happen. They also consider relapse as a kind of trial and error in the abstinence process that puts the person in a training position. Hence, this approach causes them not to think that relapse leads to losing everything (and thus the introduction to recurrence), like a computer game. This acceptance is accomplished through exercises such as metaphors and mindfulness training [24]. Also, the core of ACT in quitting addictive behaviors is the concept of flexibility and committed action [25]. One learns that there is no need to do anything against craving; instead, one can accept the craving as part of the present experience, and move toward the specified goals in life, and realize them committedly [26, 27].

About depression and anxiety, the results of the present study are similar to other studies. For example, in a study by Davoudi et al., the effectiveness of ACT on depression and comorbid anxiety with smoking cessation were

evaluated in smokers, and the results indicated higher effectiveness of this treatment than CBT [26]. In addition, ACT for depressive symptoms in people treated with methadone, showed suitable efficacy [28]. These people also learn that these constructs are a normal part of human experiences. This point of view led patients to experiencing less distress. With changing the lifestyle and acting in line with intrinsic values, one becomes closer to his goals, performs better, and naturally feels more satisfied. These overall reduce the distressing symptoms of depression and anxiety in MUS [30,29].

Despite these results, the present study also had some limitations. First, to evaluate the most effective treatment components, there was no group receiving the third wave of other therapies. Most of the study had only a three-month follow-up period and could not follow the long-term evaluation due to the study site's medical and hardware conditions. Next, it is suggested that in future research, the mediating and confounding variables be examined to investigate the results of similar research in the present study. Other factors affecting relapse and recurrence should also be examined. Moreover, women can also be used so that gender-related implications are determined.

Conclusion

The current research demonstrated that ACT was significantly effective in reducing the MUD and comorbid anxiety and depression in patients with SUD. As a result, physicians and psychologists can use this approach to treat MUD.

Conflict of Interest

The authors declare no conflicts of interest.

Ethical Approval

Written informed consent was obtained from all participants before the initiation of the research. The tools used in this study were all filled anonymously, and an ID code was used to maintain the confidentiality of personal information (IR.KUMS.RCE.1398.1203). At the end of the research process, ACT was used for the control group. In addition, this study is registered in the Thailand Registry of Clinical Trials (TCTR20200319007).

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