



Effectiveness of Acceptance and Commitment Therapy in Cognitive Emotion Regulation Strategies, Headache-Related Disability, and Headache Intensity in Patients with Chronic Daily Headache

Hassan Khazraee^{1,*}, Abdollah Omidi¹, Reza Daneshvar Kakhki², Zahra Zanjani¹ and Mojtaba Sehat³

¹Department of Clinical Psychology, Faculty of Medicine, Kashan University of Medical Science, Kashan, Iran

²Department of Neurology, Faculty of Medicine, Kashan University of Medical Sciences, Kashan, Iran

³Department of Epidemiology, Kashan University of Medical Sciences, Kashan, Iran

*Corresponding author: Department of Clinical Psychology, Kashan University of Medical Sciences, Kashan, IR Iran, E-mail: hassankhazraee@gmail.com

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Abstract

Background: Chronic daily headache is a serious disease, causing significant problems such as disability. It is characterized by pain localized to the head (headache) and headaches occurring on 15 or more days per month for more than 3 months (> 180 days per year). Programs for pain and health improvement in patients with painful diseases, such as headache, are not still fully developed. Acceptance and commitment therapy (ACT) is a new psychotherapy, which appears to be effective in the treatment of chronic pain.

Objectives: This study aimed to examine the effectiveness of ACT in cognitive emotion regulation strategies, headache-related disability, and headache intensity in patients with chronic daily headaches.

Methods: In the current study, a semi-experimental method was applied. The study was conducted at Shahid Beheshti Governmental hospital of Kashan, Iran in 2016. The sample consisted of 40 patients with chronic daily headache, who were selected via convenience sampling. The participants were randomly allocated into medical treatment as usual (MTAU) and ACT groups (20 samples per group) via block randomization. The ACT group received eight 90-minute weekly treatments, based on the ACT protocol. The cognitive emotion regulation questionnaire (CERQ), diary of headache severity, and headache-related disability inventory (HDI) were administered at pretreatment, posttreatment, and three-month follow-up in both groups.

Results: In the current study, no significant differences were found between the groups in terms of demographic variables ($P > 0.05$). In the ACT group, the mean (SD) scores of emotional and functional aspects of headache disability were 26.87 ± 10.11 and 28.50 ± 9.04 , respectively before the intervention, which decreased to 17.75 ± 8.32 and 18.12 ± 9.42 after the intervention and 21.37 ± 8.53 and 21.37 ± 9.87 in the follow-up, respectively ($P < 0.05$). In addition, the mean (SD) score of nonadjustment cognitive emotion regulation strategies was 54.31 ± 10.02 at pretreatment, which significantly reduced to 44.43 ± 7.7 at posttreatment and 49.78 ± 9.1 in the follow-up ($P < 0.05$). Furthermore, the mean (SD) score of adjustment cognitive emotion regulation strategies was 61.43 ± 12.02 in the pretest, which significantly increased to 72.06 ± 8.66 in the posttest and 69.62 ± 11.84 in the follow-up ($P < 0.05$). The mean score of headache intensity decreased from 6.40 ± 1.19 to 5.00 ± 1.09 , compared to the pretest ($P < 0.05$); however, there was no significant difference between the groups in the follow-up ($P > 0.05$).

Conclusions: The results of the present study suggested that ACT is an effective treatment for reducing nonadjustment cognitive emotion regulation strategies, headache-related disability, and headache intensity and improving adjustment emotion regulation strategies in patients with chronic daily headache.

Keywords: Acceptance and Commitment Therapy, Emotion, Disability, Chronic Daily Headache

1. Background

Chronic daily headache (CDH) refers to a group of headache disorders, occurring on ≥ 15 days per month for ≥ 3 months (1, 2). CDH includes chronic migraine, chronic tension-type headache, new daily persistent headache, and hemicrania continua (3). The overall prevalence of CDH in the general population has been reported at 1% - 4% in

previous studies (4). Patients with CDH are one of the most difficult groups to manage in neurological practice (5). CDH is recognized as a serious disease with significant adverse effects on most domains of human life, such as reduced quality of life related to physical and mental health, disability (6-8), and decreased productivity (9, 10). Overall, CDH-related disability can lead to severe and frequent

headaches, comorbidities, and associated symptoms (11-15).

Headache has three major dimensions: pain, disability, and affective distress (16). Among the contributing factors of headaches, psychological stress has been reported as the most significant factor (17,18). Stress can lead to an altered state of the brain, such as increased cortical excitability (19). Stressful life events are associated with the onset of CDH (20), which often occurs periodically (21). Numerous studies have linked pain to emotional dysregulation (22). It seems that attention and emotional reactions to pain play important roles in the persistence of pain (23) and result in more intense pain perceptions, disrupting the patient's life (24). Emotional awareness deficits are also related to somatosensory amplification (increased attention to and concern about one's body), which may prompt an increase in pain (25).

Many patients with CDH fail to follow medical treatments and seek alternative therapies. On the other hand, successful treatment plans can change most aspects of a patient's life (5). CDH should be managed with a multidisciplinary biopsychosocial approach, such as nonpharmacological, pharmacological, and complementary therapies (23). Psychological approaches have a long history of successful chronic pain treatment. One of the most common psychological interventions for chronic pain is cognitive-behavioral therapy, which has become the dominant psychological treatment for chronic pain (26, 27). However, it has some limitations (27, 28), resulting in the development of new interventions.

Various psychological interventions, including mindfulness and acceptance interventions, have been examined for their effects on pain (23, 29, 30). Acceptance-based approaches suggest that pain and impairment may be decreased by acceptance rather than escape and avoidance behaviors (31, 32). In ACT, avoidance of distress and pain is conceptualized as a major problem, substantially contributing to disability (33). Avoidance of pain predicts disability and pain-related distress in patients with chronic pain (34-36). On the other hand, acceptance unpleasant and unalterable experiences such as pain improves the patient's tolerance of pain (37, 38).

ACT includes a combination of acceptance, mindfulness, and behavior-change methods (39, 40). Mindfulness-based methods are effective in symptom reduction and improved emotional functioning for patients with chronic pain (41, 42). While other pain coping strategies attempt to reduce the symptoms, the aim of ACT is to maximize the individual's potential for a rich, fulfilling, and meaningful life, without allowing pain to be a major factor in

his/her life (7, 43). Based on empirical evidence, ACT has gained increased attention and support, particularly in the treatment of chronic pain (44). In systematic reviews, ACT has been shown to be effective in the treatment of chronic pain (45). However, these reviews specifically excluded headache, and therefore, the potential effectiveness of ACT in CDH is still unclear.

According to review studies, the high prevalence and incidence of CDH can lead to various disabling problems, such as psychological and emotional disorders, which can result in the relapse of headache symptoms and disability among patients. Considering the shortcomings of medical treatments for CDH, importance of psychological problems and stress, and possible causes of headache (emotional regulation problems, nonacceptance of pain, and disease-associated problems), it seems essential to use psychological interventions, alongside pharmacological treatments. It is assumed that psychological treatments, along with medical treatments, can reduce the risk of disability. Therefore, studying the effects of new psychological treatments, such as ACT, seems necessary in patients with CDH. In fact, ACT may provide a unified approach to the treatment of both headache-related disability and pain.

2. Objectives

This study aimed to examine the effectiveness of ACT in cognitive emotion regulation strategies, headache-related disability, and headache intensity among patients with chronic daily headache.

3. Methods

3.1. Participants and Procedure

The current semi-experimental study was conducted at Shahid Beheshti governmental hospital of Kashan, Iran in 2016. The research committee of Kashan University of Medical Sciences approved the study (ethical code, IR.KAUMS.MEDNT.REC.1396.53). The participants signed an informed consent form and were given information about the purpose of the study and their right to withdraw from the study. They were assured about the confidentiality of their personal information.

The participants included adults with chronic daily headache/migraine, who were referred by expert neurologists to the neurology clinic of Shahid Beheshti hospital of Kashan, Iran. The inclusion criteria were as follows: 1, chronic daily headache according to the international classification of headache disorders (third edition, beta

version) (46); 2, willingness to participate in the study; 3, age range of 18 - 60 years; 4, no medical diagnosis of organic brain or psychotic disorders; 5, no history of psychological treatments in the preceding six months; 6, lack of other chronic pain problems; and 7, no history of epileptic seizures or facial nerve pain.

The sample size was determined, based on the information extracted from a study by Gharaei-Ardakani et al. on the effectiveness of ACT in reducing the severity of pain experience in women with chronic headache disorder (47). The sample size was estimated at 20 subjects per group considering the effect of pain severity with a mean (standard deviation) of 3.53 (2.1) for the intervention group and 7.73 (1.7) for the control group at a significance level of 0.05 and power of 95% (second type error, 20%, β , 0.2; d, 2), using the following formula:

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

Forty patients were selected via purposive sampling and randomly assigned to ACT and medical treatment as usual (MTAU) groups through block randomization.

3.2. Intervention

The MTAU group was treated with antidepressants, beta-blockers, calcium-channel blockers, or anticonvulsants. The ACT group received ACT training in addition to MTAU. The ACT group was trained for eight weeks by an expert with a Master's degree in clinical psychology under the supervision of a clinical psychologist with a PhD degree. The adopted Persian ACT protocol for chronic pain, based on the manual of Vowles and colleagues (48), was used in this intervention. The ACT comprised of eight 90-minute weekly group sessions in two months. The overall content of the sessions is presented in Table 1.

3.3. Instruments

3.3.1. Cognitive Emotion Regulation Questionnaire (CERQ)

CERQ is a 36-item questionnaire, consisting of nonadjustment and adjustment emotion regulation strategies. All items are rated on a five-point Likert scale, ranging from one (almost never) to five (almost always) (50); a higher subscale score reflects the greater use of the strategy. Research on cognitive emotion regulation strategies has shown that all subscales have good internal consistencies (51). Cronbach's alpha for internal consistency of the subscales ranges from 0.60 to 0.80 (52). A previous study regarding the reliability of adjustment and nonadjustment strategies reported Cronbach's alpha coefficients of 0.91 and 0.87, respectively (50). In another study from

Iran, the reliability of CERQ was measured using Cronbach's alpha coefficient (0.82). Also, regarding the validity of the questionnaire, the correlation coefficients of nonadjustment emotion regulation strategies for depression and anxiety were 0.35 and 0.37, respectively in the general health questionnaire (53).

3.3.2. Headache Disability Inventory (HDI)

HDI (54) is a 25-item scale for the perceived impact of headache on emotional and daily functioning, with three possible options ("No", 0 score; "Sometimes", 2 scores; "Yes", 4 scores). HDI appears to have acceptable short-term (r , 0.93 - 0.95 for one week) and long-term (r , 0.76 - 0.83 for two months) stability (54, 55). In a study from Iran regarding the reliability of HDI, Cronbach's alpha coefficients for emotional and functional aspects were 0.68 and 0.83, respectively. In terms of concurrent validity, the correlation coefficients of emotional and functional factors of HDI and symptom checklist (SCL-25) were 0.71, 0.51, and 0.55, respectively (56).

3.3.3. Diary Scale for Headache

This scale (49) was used as a measure of headache intensity. The patients were asked to record a diary of headache intensity on a rating scale from zero (absence of pain) to ten (most intense disabling headache). The mean headache intensity in one week was calculated by dividing the sum of severity scores by seven. The minimum score of headache severity is zero, while the maximum score is ten. The headache diary was presented to five patients, as well as a neurologist and a psychiatrist, to confirm its content validity (57). The reliability coefficient of the Persian version of the scale is estimated at 0.88 (57).

3.4. Data Analysis

The collected data were analyzed in SPSS version 24 (SPSS Inc., Chicago, IL, USA). Chi square test was used to compare the demographics in the groups (Table 2). Independent sample t test was used to identify the baseline differences between the intervention and control groups in terms of clinical characteristics. Also, Kolmogorov-Smirnov test was used to describe the normal distribution of variables, followed by parametric tests. Table 3 presents the mean and standard deviation (SD) of dependent variables. Analysis of variance (ANOVA) and repeated measures ANOVA were also performed to compare the groups regarding cognitive emotion regulation strategies, headache-related disability, and headache intensity at pretreatment, posttreatment, and three-month follow-up. P value less than 0.05 was considered significant in all tests.

Table 1. The Overall Content of Treatment Sessions (Adopted from the Study by Wowles and Colleagues (46, 49))

Sessions	Objectives and Content
1	A, Review of treatment history; B, introduction of the possibility that change is possible, but perhaps not through symptom reduction.
2	A, Review of interactions between feelings, thoughts, and actions that lead to vicious cycles; (B) exercises to control thoughts and/or emotions; C, introduction of the idea that changes in action may mean changes that directly contribute to meaningful and successful living (i.e., values), not changes in stubborn avoidance behaviors; D, mindfulness practice.
3	A, Value-clarification exercises and emphasis on awareness and identification; B, practice of mindful breathing.
4	A, Continued value-clarification exercises; B, discussion about barriers and exercise of value-based actions, even in aversive situations; C, setting an effective goal related to values; D, body sensation awareness exercises.
5	A, Discussion about activity cycling and pacing; B, cognitive defusion exercises; C, awareness exercises.
6	A, Continued cognitive defusion exercises; B, "thought watching" exercise; C, continued discussion of openness to experience discomfort in the service of a meaningful life.
7	A, Awareness and exercises pertaining to the ways in which people add additional, often unnecessary, distress to already distressing situations; B, continued discussion about willingness towards a meaningful life; C, mindful walking exercise.
8	A, Preparation for relapses and setbacks.

Table 2. Demographic Characteristics of the Subjects

Variables	ACT	MTAU	Chi Square
Age	33.76	33.24	0.551
Gender			
Male	2	1	0.509
Female	14	16	
Educational level			
High school	1	4	0.562
Diploma	5	6	
Associate degree	3	1	
Bachelor's degree	5	4	
Master's degree	2	2	
Marital status			
Married	11	16	0.126
Single	5	1	
Occupation			
Salaried employee	7	6	0.159
Housewife	5	10	
Student	4	1	
Family history of headache			
With family history	12	14	0.606
Without family history	4	3	
Medication			
Antidepressant	5	5	0.71
Anticonvulsant	4	4	
Beta-blockers	4	2	
Calcium-channel blockers	0	1	
Painkillers	3	5	

Abbreviations: ACT, Acceptance and Commitment Therapy; MTAU, Medical Treatment as Usual.

4. Results

Among 40 patients with CDH, who had been randomly assigned into ACT and control groups (20 patients per group), 33 (16 from the intervention group and 17 from

the control group) completed the posttest and follow-up, and their data were included in the final analysis (Figure 1). Those who did not complete the intervention were excluded from the study.

Table 2 demonstrates the demographic characteristics of the participants. There were no significant differences between the groups at baseline in terms of demographic variables. Independent t test also showed no significant differences between the groups at baseline regarding the clinical characteristics. The results of Kolmogorov-Smirnov test revealed that variables of cognitive emotion regulation strategies, headache-related disability, and headache intensity were normally distributed in the intervention and control groups ($P > 0.05$).

Table 3 shows the participants' mean scores of dependent variables in the pretest, posttest, and follow-up. According to Table 3, there was more reduction in non-adjustment emotion regulation strategies and emotional and functional aspects of headache-related disability in the ACT group in comparison with the MTAU group from the pretest to posttest and follow-up; in fact, no reduction was observed in the MTAU group. On the other hand, adjustment emotion regulation strategies in the ACT group showed a significant increase in comparison with the MTAU group.

The results revealed the significant effects of time and interaction between time and type of treatment on changes of scores. The within-subject test of repeated measures analysis indicated a significant time \times group effect; in other words, emotion regulation strategies and all aspects of headache-related disability changed over time in the intervention group.

The ANOVA test indicated a significant difference be-

Table 3. Comparison of Outcome Measures at Pretreatment, Posttreatment, and Follow-Up in the Groups^a

Variables	Pretreatment	Posttreatment	Follow-Up	ANOVA		Repeated Measures Analysis	
				Pre- to Posttreatment	Pretreatment to Follow-Up	Time	Time × Group
				P Value	P Value	P Value	P value
Adjustment emotion regulation strategies				< 0.05 ^{b,c}	< 0.05 ^{b,c}	< 0.05 ^b	< 0.05 ^{b,c}
ACT	61.43 (12.02)	72.06 (8.66)	69.62 (11.84)				
MTAU	63.88 (15.76)	61.58 (12.53)	60.17 (12.54)				
Nonadjustment emotion regulation strategies				< 0.05 ^{b,c}	< 0.05 ^b	< 0.05 ^b	< 0.05 ^b
ACT	54.31 (10.02)	44.43 (7.7)	49.78 (9.1)				
MTAU	52.76 (6.20)	52.05 (8.39)	52.05 (5.97)				
Emotional dimension of headache disability				< 0.05 ^{b,c}	< 0.05 ^b	< 0.05 ^b	< 0.05 ^{b,c}
ACT	26.87 (10.11)	17.75 (8.32)	21.37 (8.53)				
MTAU	25.76 (5.14)	27.29 (6.66)	25.76 (5.14)				
Functional dimension of headache disability				< 0.05 ^{b,c}	< 0.05 ^b	< 0.05 ^b	< 0.05 ^{b,c}
ACT	28.50 (9.04)	18.12 (9.42)	21.37 (9.87)				
MTAU	28.76 (6.26)	28.82 (7.90)	28.76 (6.26)				
Headache intensity				< 0.05 ^b	0.386	< 0.05 ^b	0.078
ACT	6.40 (1.19)	5.00 (1.09)	5.32 (2.06)				
MTAU	5.92 (.98)	5.65 (1.24)	5.57 (1.15)				

^aValues are expressed as mean (SD).

^bP < 0.05.

^cP < 0.001.

tween the groups regarding headache intensity from pretest to posttest; however, there was no significant difference from pretest to follow-up. Figures 2 - 6 present the mean scores of adjustment and nonadjustment emotion regulation strategies, emotional and functional aspects of headache-related disability, and headache intensity in the ACT and MTAU groups at pretest, posttest, and follow-up. As shown in the graph, the groups, indicated by lines, change over time.

5. Discussion

This study compared the efficacy of ACT and MTAU in improving headache intensity, headache-related disability, and cognitive emotion regulation strategies among patients with chronic daily headache. This approach should be examined in the treatment of chronic daily headache, which is one of the most common complaints of the population. The results from highly disabled patients showed significant changes in the variables after treatment and follow-up, including improvements in nonadjustment and adjustment emotion regulation strategies

and emotional and functional aspects of headache disability, compared to usual care after intervention. In addition, the ACT group showed a significant decrease in headache intensity after treatment, compared to the control group. Headache intensity in the ACT group decreased from pretest to follow-up, although the difference was not significant. These findings are similar to previous studies on acceptance-based interventions for management of chronic pain (35, 58-63).

The present study showed that ACT might be an effective treatment for chronic daily headache. The effectiveness of ACT can be explained by processes of this treatment. One of the most important treatment techniques is mindfulness. The impact of mindfulness on patients with chronic pain has been revealed in several studies (58, 64, 65). Manipulation of attention in mindfulness techniques may influence the affective and sensory aspects of pain perception. Also, this technique increases body awareness and parasympathetic activity, leading to improved body mechanisms and reduction of pain. Finally, mindfulness strengthens emotion regulation skills, thereby decreasing stress and mood dysfunction (66, 67).

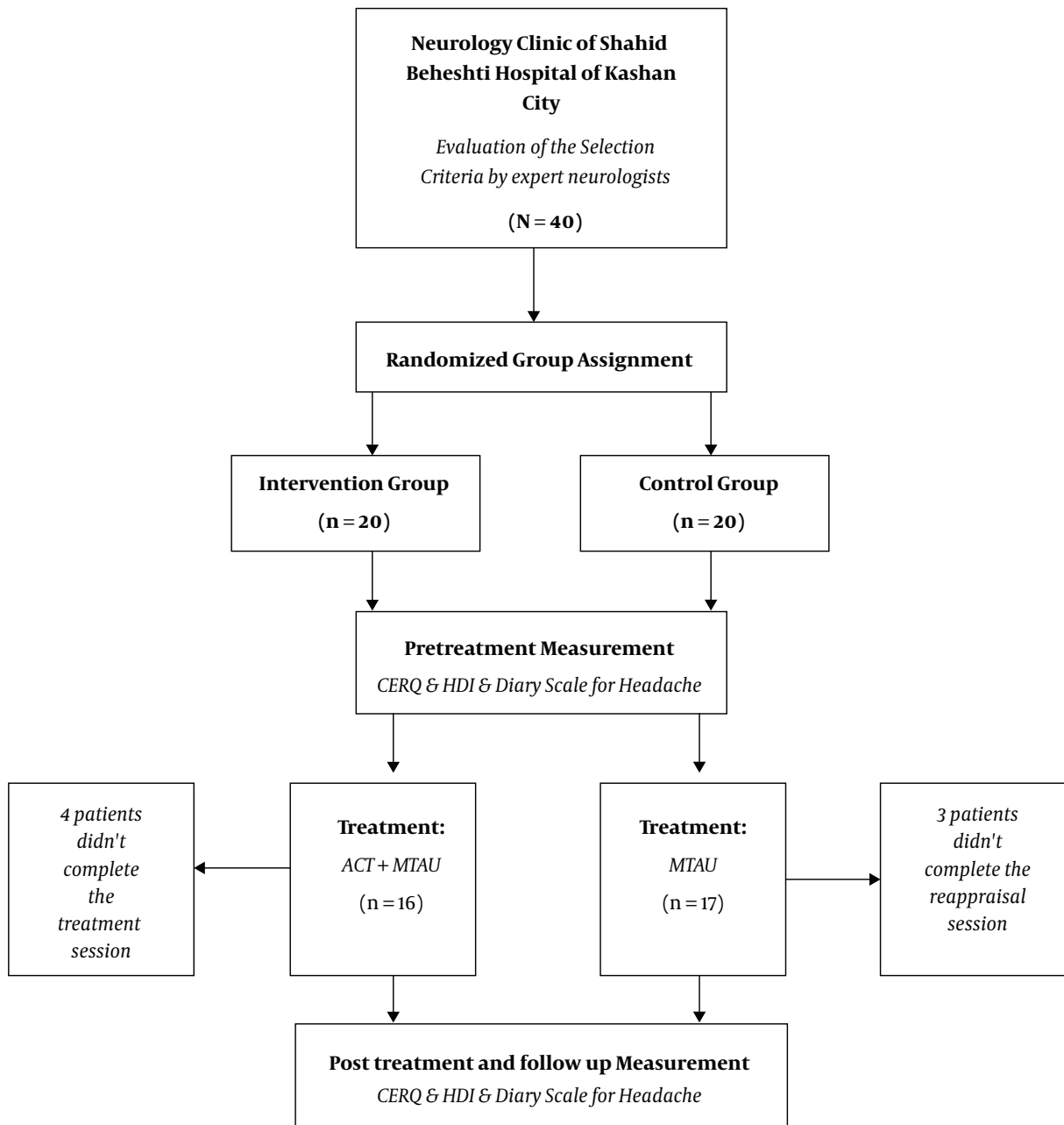


Figure 1. The study flowchart

Other processes in ACT include determination of values and committed action. In ACT, the primary goal is to alter responses to pain in order to reduce disability (68) and help patients with headache engage in value-directed behaviors and create a rich, fulfilling, and meaningful life while tackling with continuous headaches, particularly when efforts to decrease or control pain fail (69). Also, ACT

emphasizes on the necessity of pain acceptance (openness to experience pain), response to pain-related experiences without unnecessary and unhelpful struggles for pain control or avoidance, and participation in activities regardless of painful experiences in order to improve function (35, 70). The goal of acceptance is to change the patient's attitude towards the symptoms rather than to change the fre-

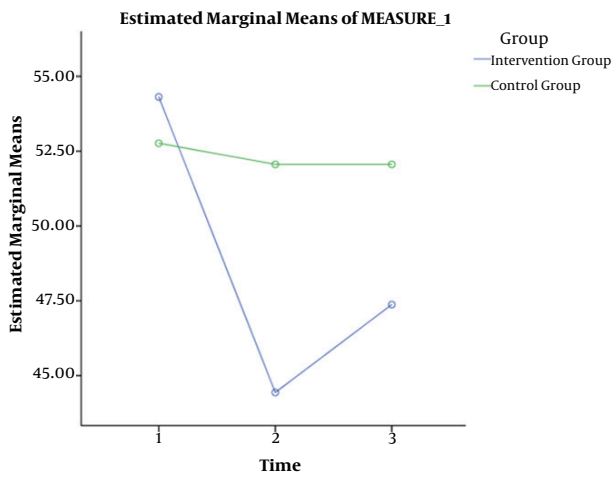


Figure 2. The mean of non-adjustment emotion regulation strategies in the intervention and control groups at pretest, posttest, and follow-up

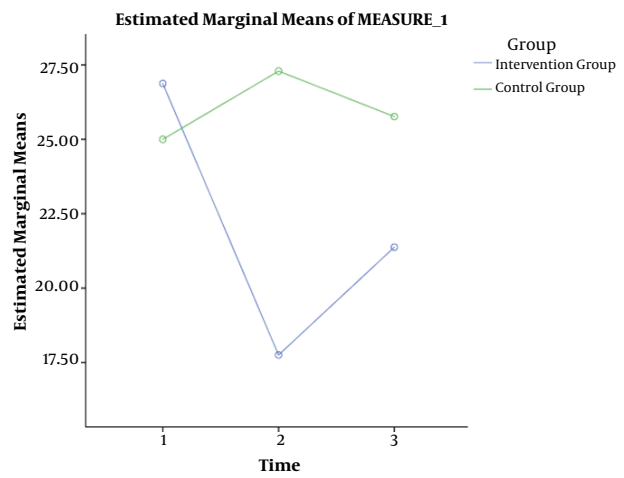


Figure 4. The mean of emotional aspect of headache disability in the intervention and control groups at pretest, posttest, and follow-up

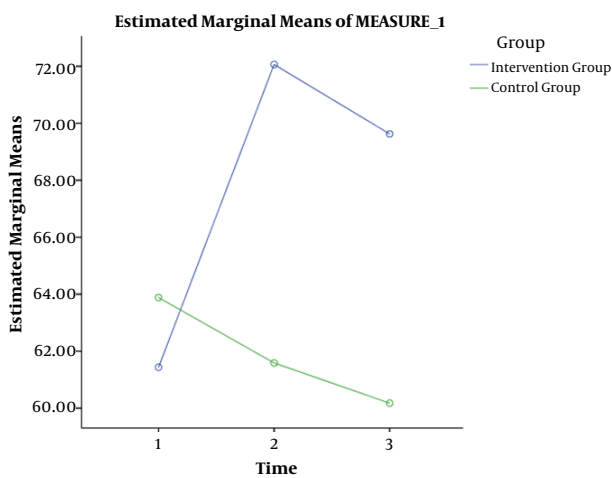


Figure 3. The mean of adjustment emotion regulation strategies in the intervention and control groups at the pretest, posttest, and follow-up

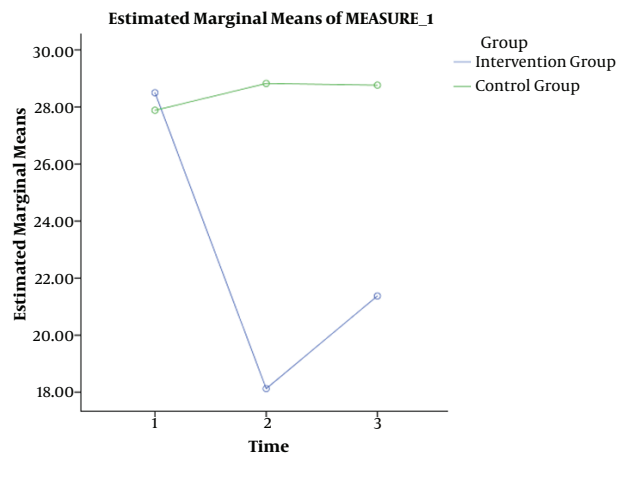


Figure 5. The mean of functional aspect of headache disability in the intervention and control groups at pretest, posttest, and follow-up

quency of symptoms.

Based on the present study, ACT is recommended as an effective psychotherapy for improving emotion regulation, headache-related disability, and headache intensity in patients with chronic daily headaches. The results also support the potential application of ACT model for chronic headaches. ACT can be combined with other medical treatments, which are known to be helpful in this population. This approach provides a promising framework for further therapy development and challenges researchers to reconsider the experience of pain.

Several limitations of this investigation need to be ex-

plained. One of the main limitations was lack of the necessary facilities to conduct the study in all governmental or private centers. Another limitation was the gender of the study sample. The majority of the participants were female, which limits the interpretation of results for males. Therefore, future investigations should attempt to replicate and extend these results and their generalizability to other settings, headache patient groups, and genders.

The strength of the present study was investigation of the effects of a new psychological treatment for patients with chronic daily headache. ACT is a unique empirical and psychological intervention, which uses acceptance and mindfulness strategies, together with commit-

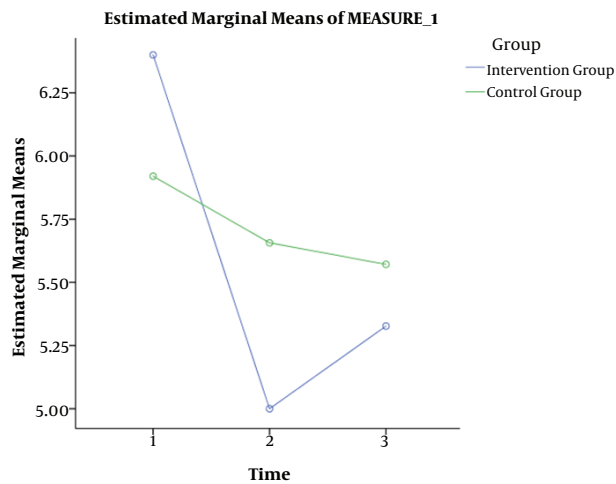


Figure 6. The mean headache intensity in the intervention and control groups at pretest, posttest, and follow-up

ment and behavior-change strategies.

Footnotes

Authors' Contribution: Study concept and design: Hassan Khazraee, Abdollah Omidi, Zahra Zanjani, Reza Daneshvar Kakhki, Mojtaba Sehat; acquisition of data: Hassan Khazraee, Reza Daneshvar Kakhki; analysis and interpretation of data: Hassan Khazraee, Mojtaba Sehat, Zahra Zanjani, drafting of the manuscript: Hassan Khazraee, Abdollah Omidi, Zahra Zanjani; critical revision of the manuscript for important intellectual content: Hassan Khazraee, Abdollah Omidi, Zahra Zanjani, statistical analysis: Hassan Khazraee, Mojtaba Sehat, Zahra Zanjani; administrative, technical, and material support: Hassan Khazraee, Abdollah Omidi, Zahra Zanjani, Reza Daneshvar Kakhki, Mojtaba Sehat; study supervision: Abdollah Omidi.

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