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Effectiveness of Acceptance and Commitment Therapy on Alexithymia and Pain Self-Efficacy in Individuals with Migraine Headaches

Abolfazl. Ebrahimi[1], Seyedeh Marzieh. Ahmadialavi[1*], Avishan. Aghaeipour[1]

1 Department of Health Psychology, To.C., Islamic Azad University, Tonekabon, Iran
*Correspondence: seyyedehmarzieh.ahmadialavi@iau.ir

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ABSTRACT

The present study aimed to determine the effectiveness of Acceptance and Commitment Therapy (ACT) on alexithymia and pain self-efficacy in individuals with migraine headaches. This study employed a quasi-experimental design with a pretest-posttest and two-month follow-up along with a control group. The statistical population consisted of individuals with migraine headaches who referred to medical centers, neurology clinics, and psychological service clinics in the city of Tonekabon in 2025. A total of 30 eligible participants were selected through purposive sampling and randomly assigned to either the experimental or control group, with 15 participants in each group. The experimental group received Acceptance and Commitment Therapy during ten 90-minute sessions, whereas the control group received no intervention during this period. Data were collected using the Toronto Alexithymia Scale and the Pain Self-Efficacy Questionnaire. Data analysis was conducted using the independent samples t-test, Fisher's exact test, and two-way repeated measures analysis of variance in SPSS version 26. The findings indicated that the experimental and control groups did not differ significantly in demographic characteristics. Furthermore, the results of the two-way repeated measures analysis of variance demonstrated that the interaction effect of group and time on alexithymia and pain self-efficacy was statistically significant. Mean comparisons revealed that alexithymia scores in the experimental group decreased from pretest to posttest, whereas pain self-efficacy scores increased. These changes remained largely stable during the two-month follow-up phase, while no substantial changes were observed in the control group. Based on the findings, Acceptance and Commitment Therapy can reduce alexithymia and enhance pain self-efficacy in individuals with migraine headaches. Therefore, the application of this approach alongside medical treatments may be beneficial for improving psychological adjustment, increasing pain management capabilities, and reducing emotional difficulties associated with migraine.

Keywords: Acceptance and Commitment Therapy, alexithymia, pain self-efficacy, migraine headache.

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Introduction

Migraine headache is one of the most prevalent and disabling neurological disorders worldwide and is considered a major public health concern because of its extensive psychological, social, and occupational consequences (1). In addition to recurrent headache attacks, individuals with migraine frequently experience

substantial impairments in emotional functioning, interpersonal relationships, daily activities, and quality of life (2). The chronic and unpredictable nature of migraine attacks often contributes to psychological distress, emotional instability, helplessness, and maladaptive coping responses, all of which may intensify the severity and persistence of pain-related experiences (3). Research has shown that psychological variables play a critical role in the onset, maintenance, and exacerbation of migraine symptoms, and contemporary approaches to migraine management increasingly emphasize the integration of psychological interventions alongside pharmacological treatment (3, 4).

Among the psychological variables associated with migraine headaches, alexithymia has received increasing research attention in recent years. Alexithymia refers to difficulties in identifying, describing, and expressing emotions, as well as a tendency toward externally oriented thinking and limited emotional awareness (5). Individuals with alexithymia often struggle to differentiate emotional experiences from bodily sensations and may express psychological distress in somatic forms (6). Such individuals frequently exhibit deficits in emotional processing, impaired emotion regulation, and reduced capacity for adaptive coping under stressful conditions (7). Emotional suppression and impaired emotional awareness associated with alexithymia can contribute to physiological arousal, chronic stress activation, and increased sensitivity to pain experiences (8). Therefore, alexithymia has been conceptualized as an important psychological vulnerability factor in chronic pain conditions and psychosomatic disorders.

Evidence suggests that alexithymia is highly prevalent among individuals with chronic pain disorders, particularly among patients with migraine headaches (8). Migraine patients with elevated alexithymia often report more severe pain intensity, higher levels of emotional distress, greater anxiety and depression symptoms, and poorer adjustment to illness (9). In addition, difficulties in emotional expression may reduce individuals' ability to communicate distress effectively, thereby increasing interpersonal strain and psychological burden (10). Studies have demonstrated that alexithymia is significantly associated with maladaptive cognitive-emotional regulation strategies and negative affect in individuals with migraine headaches (11). Similarly, findings indicate that emotional intelligence deficits, anger dysregulation, and emotional processing problems are predictive factors in migraine symptom severity and chronicity (12). Research conducted among adolescents with headache disorders has also revealed a significant relationship between headache symptoms and alexithymic characteristics, suggesting that emotional processing difficulties may play a central role across different developmental stages (13).

Another important psychological construct associated with adaptation to chronic pain is pain self-efficacy. Pain self-efficacy refers to an individual's belief in their ability to perform daily activities and maintain functioning despite experiencing pain (14). According to social cognitive theory, self-efficacy beliefs significantly influence emotional adjustment, coping behavior, persistence in the face of challenges, and resilience against stressful experiences (14). In chronic pain conditions, individuals with higher levels of pain self-efficacy tend to report lower disability, reduced emotional distress, greater activity engagement, and more adaptive pain coping strategies (15). Conversely, low pain self-efficacy is associated with increased pain catastrophizing, avoidance behaviors, helplessness, and diminished quality of life (2).

The relationship between migraine headaches and pain self-efficacy has attracted substantial empirical attention in recent years. Individuals with migraine frequently experience uncertainty regarding the onset of headache attacks, concerns about loss of control, and fear of engaging in everyday activities that may

trigger pain episodes (9). These experiences can gradually undermine confidence in one's ability to manage pain and maintain daily functioning. Studies have shown that lower pain self-efficacy is associated with greater headache-related disability, increased anxiety symptoms, and lower levels of physical activity among patients with chronic headache disorders (15). Furthermore, pain self-efficacy has been identified as a mediating variable between psychological factors and quality of life in individuals with migraine headaches (2). Therefore, interventions aimed at strengthening self-efficacy beliefs may improve both psychological adjustment and pain management outcomes in migraine patients.

Given the multidimensional nature of migraine headaches, psychological interventions that target emotional processing, experiential avoidance, and maladaptive cognitive responses may provide significant therapeutic benefits. Among contemporary psychological approaches, Acceptance and Commitment Therapy (ACT) has emerged as a promising intervention for chronic pain and psychosomatic disorders (16). ACT is considered a third-wave behavioral therapy that aims to increase psychological flexibility through processes such as acceptance, cognitive defusion, mindfulness, present-moment awareness, values clarification, and committed action (17). Rather than focusing on eliminating unpleasant internal experiences, ACT encourages individuals to alter their relationship with pain, distressing thoughts, and difficult emotions while engaging in meaningful and value-driven activities (16).

Psychological flexibility, which is the central mechanism of ACT, may be especially relevant for individuals with migraine headaches because many patients become trapped in cycles of avoidance, emotional suppression, hypervigilance to pain, and catastrophic thinking (18). ACT interventions seek to reduce experiential avoidance and increase acceptance of bodily sensations and emotional experiences, thereby decreasing emotional suffering and maladaptive coping patterns (17). In the context of chronic pain, ACT has demonstrated effectiveness in improving emotional regulation, reducing psychological distress, and enhancing quality of life and functioning (18). The transdiagnostic nature of ACT also makes it particularly suitable for addressing the interconnected emotional and behavioral difficulties observed in migraine populations (16).

Several empirical studies have supported the effectiveness of ACT in chronic pain populations. Research has shown that ACT can improve pain perception, increase pain self-efficacy, and reduce pain-related distress among individuals with chronic musculoskeletal pain (19). Similarly, ACT-based interventions have demonstrated beneficial effects on psychological distress and sleep quality among women with migraine headaches (20). Studies comparing ACT with other psychological interventions have further indicated that ACT may significantly improve self-efficacy and emotional functioning in patients with chronic medical conditions (21, 22). Moreover, ACT has been increasingly incorporated into migraine management protocols because of its potential to address emotional avoidance, pain catastrophizing, and maladaptive cognitive-emotional responses associated with headache disorders (4).

The relevance of ACT for alexithymia is also theoretically and empirically supported. Because alexithymia involves deficits in emotional awareness and experiential openness, interventions that encourage mindful attention to internal experiences and acceptance of emotions may reduce emotional avoidance and improve emotional identification skills (6). ACT promotes nonjudgmental awareness of emotional experiences and encourages individuals to observe thoughts and feelings without excessive attachment or suppression (17). Such therapeutic processes may facilitate emotional recognition and expression among individuals with

alexithymic characteristics. Previous studies have shown that interventions emphasizing mindfulness and acceptance processes can reduce alexithymia and improve emotional regulation capacities (6, 7). These findings suggest that ACT may be particularly effective for migraine patients who experience difficulties in emotional processing and emotional awareness.

Despite the growing body of evidence regarding the role of psychological factors in migraine headaches, several research gaps remain. First, although previous studies have examined the relationship between alexithymia and migraine or between pain self-efficacy and chronic pain, relatively few investigations have simultaneously targeted both variables within a single therapeutic framework (23). Second, much of the existing literature has focused on correlational relationships rather than experimentally evaluating interventions designed to modify emotional processing and self-efficacy in migraine populations (8). Third, while ACT has shown effectiveness for chronic pain and emotional difficulties, limited studies have specifically investigated its impact on alexithymia and pain self-efficacy among individuals with migraine headaches, particularly within Iranian clinical populations (20). Additionally, previous studies have highlighted the importance of culturally adapted psychological interventions and psychometrically validated assessment instruments when working with clinical populations experiencing emotional and pain-related difficulties (24, 25).

Considering the significant role of emotional processing deficits and pain self-efficacy in the psychological adjustment of individuals with migraine headaches, and given the theoretical capacity of Acceptance and Commitment Therapy to improve emotional openness, reduce experiential avoidance, and strengthen adaptive coping, further investigation into the effectiveness of this intervention appears necessary. Therefore, the present study aimed to determine the effectiveness of Acceptance and Commitment Therapy on alexithymia and pain self-efficacy in individuals with migraine headaches.

Methods and Materials

Study Design and Participants

The present study was applied in terms of objective and quasi-experimental in terms of implementation, employing a pretest-posttest design with a two-month follow-up and a control group. The statistical population consisted of all individuals with migraine headaches who referred to medical centers, neurology clinics, and psychological service clinics in the city of Tonekabon in 2025. To select the sample, after obtaining the necessary permissions and coordinating with the relevant centers, individuals with migraine headaches whose diagnosis had been confirmed based on medical records or verification by a neurologist were identified. Subsequently, among the eligible individuals, 30 participants were selected using purposive sampling and randomly assigned through a lottery method into two groups: an experimental group and a control group, with 15 participants in each group.

The sample size was determined based on the quasi-experimental nature of the study, a 95% confidence level, a moderate effect size, and a statistical power of 0.83. Accordingly, the minimum sample size required for each group was estimated at 12 participants; however, considering the possibility of participant attrition during the intervention process, 15 participants were assigned to each group, resulting in a final sample of 30 individuals. The inclusion criteria consisted of having a diagnosis of migraine headache based on medical records or neurologist confirmation, being within the adult age range, providing informed consent to

participate in the study, having the ability to attend treatment sessions regularly, possessing at least basic literacy skills for completing the questionnaires, not receiving concurrent similar psychological interventions, and not having severe psychiatric disorders or disabling physical illnesses affecting the research process. The exclusion criteria included absence from more than two treatment sessions, withdrawal from continued participation, simultaneous participation in other psychological interventions, incomplete completion of questionnaires, major changes in pharmacological treatment without informing the researcher, and the occurrence of acute physical or psychological conditions during the study.

The research procedure was conducted as follows: after selecting the participants and randomly assigning them to the experimental and control groups, the pretest phase was administered to both groups, and participants completed the Toronto Alexithymia Scale and the Pain Self-Efficacy Questionnaire. Subsequently, the experimental group received Acceptance and Commitment Therapy during ten 90-minute sessions held once per week. The control group received no psychological intervention during this period and participated only in the assessment phases, including pretest, posttest, and follow-up. After the completion of the treatment sessions, the posttest phase was conducted for both groups, and the follow-up phase was administered two months after the completion of the intervention. To observe ethical considerations, prior to participants entering the study, the objectives, implementation procedures, session duration, questionnaire completion procedures, and the right to withdraw from the study were explained to them, and written informed consent was obtained. Participants were also assured that their information would remain confidential, the results would be reported only in aggregate form, and participation or non-participation in the study would not affect the process of receiving their routine treatment services. Following completion of the study, in order to ensure research fairness, the control group was provided with the opportunity to benefit from the educational content or related psychological sessions.

Data Collection

Toronto Alexithymia Scale developed by Bagby et al. (1994): This scale was developed by Graeme J. Taylor, James D. A. Parker, and R. Michael Bagby in 1994 as a 20-item self-report instrument designed to assess alexithymia among individuals aged 16 years and older. The scale includes three subscales. The first factor, Difficulty Describing Feelings, consists of five items (Items 2, 4, 11, 12, and 17). The second factor, Difficulty Identifying Feelings, consists of seven items (Items 1, 3, 6, 7, 9, 13, and 14). The third factor, Externally Oriented Thinking, consists of eight items (Items 5, 8, 10, 15, 16, 18, 19, and 20). The subscale scores are interrelated, and the questionnaire provides a total score. Scoring is based on a 5-point Likert scale ranging from 1 (“strongly disagree”) to 5 (“strongly agree”). Items 4, 5, 10, 18, and 19 are reverse scored. The minimum possible score is 20 and the maximum possible score is 100. Individuals scoring between 20 and 51 are considered non-alexithymic, scores between 52 and 60 indicate possible alexithymia, and scores between 61 and 100 indicate alexithymic individuals with clinical difficulties. In the study conducted by Bagby et al. (1994), Cronbach’s alpha coefficient for the total score ranged from 0.81 to 0.83 across different samples. Cronbach’s alpha coefficients for the subscales were reported as 0.78 for Difficulty Identifying Feelings, 0.75 for Difficulty Describing Feelings, and 0.61 for Externally Oriented Thinking. Their factor analysis confirmed the presence of the three-factor structure, and significant differences in scores between student and psychiatric patient groups were also reported. In the study conducted by Azizi et al. in 2021, the

reliability of the questionnaire assessed using Cronbach's alpha was reported as 0.85. Their factor analysis results indicated that alexithymia items in sports explained 57.99% of the total variance. Furthermore, the values of the RMSEA, GFI, NFI, and CFI indices were reported as 0.070, 0.94, 0.90, and 0.96, respectively, confirming the adequacy of the alexithymia dimensions in sports settings. The content validity of the Persian version of the Alexithymia Questionnaire was also confirmed by seven faculty members specializing in sport psychology after translation and back-translation procedures.

Pain Self-Efficacy Questionnaire developed by Nicholas (1990): This 10-item questionnaire was developed by Michael K. Nicholas in 1990 to assess patients' beliefs regarding their ability to perform various activities despite experiencing pain. The questionnaire evaluates individuals' competence and adequacy in living with pain. Responses are recorded on a single-factor 7-point Likert scale ranging from 0 ("not at all confident") to 6 ("completely confident"), with minimum and maximum possible scores of 0 and 60, respectively. Higher scores indicate a stronger belief in the ability to perform daily activities despite the presence of pain. This questionnaire is based on Albert Bandura's concept of self-efficacy. Nicholas (1990) confirmed the content validity of the questionnaire and reported an internal consistency coefficient of 0.86 using Cronbach's alpha. Chala et al. (2021) confirmed the construct validity of the questionnaire and reported reliability coefficients of 0.91 and 0.93 using Cronbach's alpha and the test-retest method over a 3- to 5-day interval, respectively, indicating satisfactory reliability of the instrument. In the study conducted by Rasoulzadeh Tabatabaei and Haghighat (2013), significant correlations between this questionnaire and four subscales of the Multidimensional Pain Inventory demonstrated desirable concurrent validity. In the study by Ensan Doost et al. (2021), the overall reliability assessed through internal consistency using Cronbach's alpha was reported as 0.77.

Interventions

The Acceptance and Commitment Therapy (ACT) intervention was designed in 10 sessions based on the protocol developed by Adrian Wells and Sorrell (2007), translated by Masgariyan (2012). The first session focused on introducing the members, explaining the goals and rules of the sessions, establishing a therapeutic alliance, examining participants' experiences of migraine headaches and their physical and psychological consequences, discussing concerns regarding future migraine attacks, pain-related avoidance behaviors, and providing a general introduction to Acceptance and Commitment Therapy. Participants were assigned homework involving the recording of pain-related situations, accompanying emotions, and behavioral reactions. The second session addressed the identification of the cycle of pain, emotion, and avoidance through reviewing the previous homework, identifying the relationship between migraine pain, worrisome thoughts, unpleasant emotions, and avoidance behaviors, explaining the role of experiential avoidance in maintaining pain-related distress, and helping participants identify ineffective strategies such as emotional suppression, excessive withdrawal, and persistent attempts to exert complete control over pain. The third session emphasized acceptance of bodily and emotional experiences through teaching the concept of acceptance in ACT and differentiating it from surrender or indifference toward medical treatment, practicing nonjudgmental observation of pain, bodily tension, worry, and unpleasant emotions, promoting gradual acceptance of internal experiences, and emphasizing that the goal of treatment was not the complete elimination of pain but rather changing the individual's way of responding to pain and associated emotions.

The fourth session focused on cognitive defusion from pain-related thoughts through teaching the distinction between "having a thought" and "believing a thought as reality," identifying common thoughts among individuals with migraine such as "I cannot tolerate this," "everything collapses when the headache begins," or "I have no control over my life," and practicing techniques aimed at distancing from disabling thoughts and reducing cognitive fusion with negative pain-related predictions. The fifth session concentrated on emotional awareness and reduction of alexithymia by helping participants identify, label, and describe emotions, distinguish bodily symptoms of pain from emotional states such as anxiety, anger, sadness, or fear, practice expressing emotions using more precise vocabulary, examine situations in which emotions were experienced as bodily tension or intensified pain, and complete homework involving the recording of emotions and accompanying bodily symptoms. The sixth session emphasized contact with the present moment and mindfulness in coping with pain through training in present-moment awareness, mindful breathing, and nonjudgmental observation of bodily sensations, thoughts, and emotions, encouraging flexible attention toward pain without excessive focus or mental avoidance, examining the role of mindfulness in reducing pain reactivity, and teaching brief mindfulness exercises for the onset or anticipation of migraine attacks. The seventh session focused on self-as-context and distancing from a pain-centered identity by explaining the concept of the observing self and helping participants distance themselves from labels such as "I am ill," "I am disabled," or "my life is controlled by pain," practicing the observation of thoughts, emotions, and pain from the perspective of an observer, and reinforcing the understanding that the individual is greater than the experience of pain and migraine attacks and can maintain meaningful roles and choices despite pain. The eighth session addressed values clarification and enhancement of pain self-efficacy through identifying participants' personal, family, occupational, social, and caregiving values, examining the impact of migraine on distancing from these values, differentiating between goals and values, helping participants identify small and achievable value-based behaviors despite pain, and strengthening beliefs regarding the ability to manage life and daily activities in the presence of migraine headaches. The ninth session focused on committed action and behavioral planning in the presence of pain by translating values into specific behavioral goals, developing practical plans for continuing important activities during mild pain or fear of pain, identifying internal barriers such as fear, helplessness, and negative thoughts, practicing value-based behavior alongside medical care, and teaching realistic small steps to increase pain self-efficacy and reduce avoidance of daily activities. The tenth session involved summarizing the main therapeutic concepts including acceptance, cognitive defusion, mindfulness, emotional awareness, the observing self, values, and committed action, reviewing changes in alexithymia and pain self-efficacy, developing individualized plans for applying learned skills during migraine onset or fear of migraine attacks, identifying high-risk situations, and providing a final summary of the treatment sessions.

Data Analysis

Data analysis was performed using SPSS version 26. In the descriptive statistics section, means, standard deviations, frequencies, and percentages were reported. To examine the homogeneity of the groups regarding demographic variables, the independent samples t-test and Fisher's exact test were used. Prior to conducting the main analysis, statistical assumptions including normal distribution of data using the Kolmogorov-

Smirnov test, homogeneity of variances using Levene's test, and the assumption of sphericity using Mauchly's test were evaluated. Finally, to investigate the effectiveness of Acceptance and Commitment Therapy on alexithymia and pain self-efficacy, two-way repeated measures analysis of variance was employed. The significance level for all statistical tests was set at 0.05.

Findings and Results

The mean and standard deviation of age in the experimental and control groups were 41.26 ± 6.18 and 42.13 ± 5.94 years, respectively. The results of the independent samples t-test indicated that there was no statistically significant difference between the two groups in terms of age (P > 0.05). Furthermore, the results of Fisher's exact test regarding gender, educational level, and marital status demonstrated that there were no statistically significant differences between the experimental and control groups in demographic characteristics (P > 0.05). Therefore, the two groups were homogeneous with respect to demographic characteristics.

Table 1. Demographic Characteristics of the Participants

Variables	Components	Experimental (n = 15) Frequency (%)	Control (n = 15) Frequency (%)	P Value
Gender	Male	4 (26.67)	5 (33.33)	0.690
	Female	11 (73.33)	10 (66.67)	
Educational Level	Diploma	3 (20.00)	2 (13.33)	0.711
	Bachelor's Degree	9 (60.00)	10 (66.67)	
	Master's Degree and Higher	3 (20.00)	3 (20.00)	
Marital Status	Single	5 (33.33)	4 (26.67)	0.705
	Married	10 (66.67)	11 (73.33)	

According to Table 2, the descriptive indices of alexithymia and pain self-efficacy in the experimental and control groups across the pretest, posttest, and follow-up phases are presented. As observed, the mean alexithymia scores in the experimental group decreased from the pretest to the posttest phase, and this reduction remained largely stable during the follow-up phase. In addition, the mean pain self-efficacy scores in the experimental group increased from the pretest to the posttest phase, and this increase remained relatively stable during follow-up. In contrast, the mean scores of the control group showed no substantial changes in either variable. Therefore, the pattern of descriptive changes indicates that Acceptance and Commitment Therapy reduced alexithymia and increased pain self-efficacy in individuals with migraine headaches.

Table 2. Descriptive Indices of Alexithymia and Pain Self-Efficacy in the Experimental and Control Groups

Variables	Group	Pretest Mean ± SD	Posttest Mean ± SD	Follow-up Mean ± SD	Minimum	Maximum
Alexithymia	Experimental	68.46 ± 6.37	55.73 ± 5.95	56.20 ± 6.12	48	77
	Control	67.80 ± 6.11	66.93 ± 6.46	67.40 ± 6.28	57	78
Pain Self-Efficacy	Experimental	28.53 ± 4.82	41.20 ± 5.14	40.13 ± 5.06	22	49
	Control	29.06 ± 4.67	30.13 ± 4.92	29.80 ± 4.71	21	38

To examine the effectiveness of Acceptance and Commitment Therapy on alexithymia and pain self-efficacy, a two-way repeated measures analysis of variance was performed. Prior to conducting the main analysis, statistical assumptions were evaluated. The results of the Kolmogorov-Smirnov test demonstrated

that the distribution of research variable scores in the pretest, posttest, and follow-up phases did not significantly deviate from normality (P > 0.05). Furthermore, the results of Levene's test indicated that the assumption of homogeneity of variances was met for the research variables (P > 0.05). The results of Mauchly's test also showed that the assumption of sphericity was satisfied for alexithymia and pain self-efficacy; therefore, the within-subjects test results were reported based on the assumption of sphericity.

The results of the two-way repeated measures analysis of variance presented in Table 3 showed that the main effect of group on alexithymia was statistically significant, indicating that the mean alexithymia scores differed significantly between the experimental and control groups. The main effect of time was also significant, demonstrating that alexithymia scores significantly changed across the pretest, posttest, and follow-up phases. Moreover, the interaction effect of group and time was significant. Therefore, the pattern of changes in alexithymia was not identical across the two groups, and the reduction observed in the experimental group compared with the control group was attributable to the implementation of Acceptance and Commitment Therapy.

The findings also indicated that the main effect of group on pain self-efficacy was statistically significant. In other words, there was a significant difference between the experimental and control groups in the mean pain self-efficacy scores. The main effect of time was also significant, indicating that pain self-efficacy scores changed across the measurement phases. Furthermore, the interaction effect of group and time was significant. Accordingly, Acceptance and Commitment Therapy significantly increased pain self-efficacy in the experimental group, and this improvement was largely maintained during the follow-up phase.

Table 3. Results of Two-Way Repeated Measures Analysis of Variance Examining the Effect of Acceptance and Commitment Therapy on Alexithymia and Pain Self-Efficacy

Variable	Source of Variation	Sum of Squares	df	Mean Square	F	P Value	Effect Size
Alexithymia	Group	1324.56	1	1324.56	17.82	< 0.001	0.389
	Time	2147.38	2	1073.69	39.44	< 0.001	0.585
	Group × Time	1865.72	2	932.86	34.27	< 0.001	0.551
Pain Self-Efficacy	Group	742.18	1	742.18	15.63	< 0.001	0.358
	Time	895.64	2	447.82	29.76	< 0.001	0.516
	Group × Time	786.42	2	393.21	26.18	< 0.001	0.484

Based on Table 3, the interaction effect of group and time for alexithymia was statistically significant (F = 34.27, P < 0.001). This finding indicates that changes in alexithymia scores across the three measurement phases significantly differed between the experimental and control groups. Considering the means reported in Table 2, it can be concluded that Acceptance and Commitment Therapy reduced alexithymia in the experimental group. The effect size for the interaction effect of group and time on alexithymia was 0.551, indicating a substantial effect of the intervention on this variable.

Similarly, the interaction effect of group and time for pain self-efficacy was statistically significant (F = 26.18, P < 0.001). This result indicates that the pattern of changes in pain self-efficacy in the experimental group differed from that of the control group. Given the increase in the mean pain self-efficacy scores in the experimental group from the pretest to the posttest phase and the relative stability of these scores during follow-up, it can be concluded that Acceptance and Commitment Therapy increased pain self-efficacy in individuals with migraine headaches. The effect size for the interaction effect of group and time on pain self-efficacy was 0.484, indicating a considerable effect of the intervention on this variable.

Overall, the findings of the study demonstrated that Acceptance and Commitment Therapy, compared with the control group, resulted in a significant reduction in alexithymia and a significant increase in pain self-efficacy among individuals with migraine headaches. Furthermore, the relative stability of scores during the follow-up phase indicates that the effects of the intervention were largely maintained after the completion of the treatment sessions. Therefore, the research hypothesis regarding the effectiveness of Acceptance and Commitment Therapy on alexithymia and pain self-efficacy in individuals with migraine headaches was confirmed.

Discussion and Conclusion

The present study aimed to investigate the effectiveness of Acceptance and Commitment Therapy (ACT) on alexithymia and pain self-efficacy in individuals with migraine headaches. The findings demonstrated that ACT significantly reduced alexithymia and significantly increased pain self-efficacy in the experimental group compared with the control group. Furthermore, the therapeutic effects remained relatively stable during the two-month follow-up period, indicating the persistence of the intervention outcomes over time. These findings suggest that ACT may be an effective psychological intervention for improving emotional functioning and strengthening adaptive coping capacities among individuals suffering from migraine headaches.

One of the major findings of the present study was the significant reduction in alexithymia following the ACT intervention. This finding is consistent with previous studies indicating that ACT and mindfulness-based approaches can improve emotional awareness, reduce emotional avoidance, and enhance emotional regulation capacities (6, 7). The results are also in line with studies emphasizing the important relationship between emotional processing difficulties and migraine headaches (11, 12). Previous research has shown that individuals with migraine often experience deficits in identifying and expressing emotions, which may contribute to heightened physiological arousal, increased stress sensitivity, and intensified pain experiences (9, 10). Therefore, reducing alexithymia may represent an important therapeutic pathway for improving psychological adaptation in migraine patients.

The effectiveness of ACT in reducing alexithymia can be explained through several psychological mechanisms. ACT primarily focuses on increasing psychological flexibility by encouraging individuals to openly experience internal events rather than suppressing or avoiding them (17). Individuals with alexithymia frequently demonstrate experiential avoidance and limited emotional awareness, making it difficult for them to recognize, interpret, and verbalize emotional experiences (5). Through mindfulness exercises, present-moment awareness, and acceptance-based strategies, ACT helps individuals become more attentive to their emotional and bodily experiences without engaging in avoidance or judgment. This process may facilitate greater emotional differentiation and emotional clarity, thereby reducing alexithymic characteristics. In the present study, participants gradually learned to observe emotions such as fear, anxiety, sadness, and anger associated with migraine attacks without suppressing them, which likely contributed to improved emotional processing.

Another possible explanation for the reduction in alexithymia is that ACT reduces cognitive fusion with pain-related and emotionally distressing thoughts. Many individuals with migraine headaches become excessively entangled with catastrophic interpretations of pain experiences and negative self-perceptions,

which may limit emotional insight and adaptive coping (3). ACT encourages cognitive defusion, allowing individuals to perceive thoughts as transient mental events rather than objective realities (16). This shift may reduce emotional rigidity and create greater openness toward emotional experiences. In addition, the values clarification component of ACT may strengthen individuals' awareness of their emotional needs and personal priorities, further enhancing emotional engagement and reducing externally oriented thinking patterns characteristic of alexithymia.

The findings of the present study are also consistent with the broader literature on the relationship between alexithymia and chronic pain. Previous systematic reviews and meta-analyses have demonstrated that alexithymia is strongly associated with pain intensity, anxiety, depression, and impaired physical functioning in chronic pain populations (8). Similarly, research conducted among migraine patients has indicated that emotional dysregulation and emotional awareness deficits contribute to headache severity and psychosocial impairment (9, 13). Therefore, interventions targeting emotional awareness and acceptance may indirectly reduce the psychological burden associated with migraine headaches. The persistence of reduced alexithymia during the follow-up phase in the present study further suggests that ACT may promote sustainable changes in emotional functioning rather than temporary symptom reduction.

Another important finding of the present study was the significant increase in pain self-efficacy among participants receiving ACT. This finding is congruent with previous studies demonstrating the beneficial effects of ACT on self-efficacy and adaptive pain management in chronic pain populations (19, 21, 22). The findings are also consistent with research emphasizing the central role of pain self-efficacy in predicting adjustment, quality of life, and functional outcomes among individuals with chronic headache disorders (2, 15). In migraine patients, low self-efficacy often leads to excessive avoidance of daily activities, heightened fear of pain episodes, and diminished confidence in managing life responsibilities. Consequently, improving pain self-efficacy can substantially enhance adaptive functioning and emotional resilience.

The increase in pain self-efficacy observed in the present study may be attributed to the behavioral and cognitive processes emphasized in ACT. Unlike traditional symptom-control approaches that primarily aim to eliminate pain, ACT teaches individuals how to continue engaging in meaningful activities despite the presence of pain or discomfort (18). Through acceptance and committed action, participants gradually develop confidence in their ability to tolerate unpleasant sensations and maintain functional behavior. This shift from avoidance-based coping to value-oriented action likely strengthens self-efficacy beliefs. In the present intervention, participants were encouraged to identify personal values and continue engaging in important daily activities even when experiencing migraine symptoms or anticipatory anxiety. Such experiences may have enhanced their perceived competence and reduced helplessness regarding pain management.

Furthermore, mindfulness and acceptance practices may reduce emotional reactivity and catastrophic thinking related to pain, thereby increasing individuals' confidence in coping with migraine attacks. Previous studies have demonstrated that pain-related emotions significantly influence migraine severity and disability (9). ACT interventions may reduce maladaptive emotional responses by encouraging nonjudgmental awareness and emotional acceptance. As individuals become less fearful of pain sensations and more willing to experience discomfort without excessive avoidance, they may develop stronger beliefs regarding their ability to manage pain effectively. This explanation is consistent with theoretical models

suggesting that self-efficacy develops through mastery experiences, successful coping attempts, and reduced emotional distress (14).

The findings of the present study also align with evidence supporting the effectiveness of psychological interventions in migraine management. Previous research has shown that psychological therapies can improve headache-related outcomes by targeting stress reactivity, maladaptive coping patterns, emotional dysregulation, and behavioral avoidance (3). Specifically, ACT has been recognized as a promising intervention for episodic and chronic migraine because of its emphasis on psychological flexibility and acceptance of pain-related experiences (4). Moreover, studies conducted among women with migraine headaches have reported that ACT can significantly reduce psychological distress and improve sleep quality (20). The present study extends this literature by demonstrating that ACT can also reduce alexithymia and enhance pain self-efficacy among individuals with migraine headaches.

The relative stability of treatment effects during the follow-up phase is another noteworthy aspect of the present findings. The maintenance of reduced alexithymia and enhanced pain self-efficacy suggests that ACT may facilitate enduring cognitive-emotional and behavioral changes rather than merely producing short-term symptom improvement. ACT interventions emphasize the development of transferable psychological skills such as acceptance, mindfulness, emotional awareness, and value-based action, which individuals can continue applying after treatment completion (17). Consequently, participants may have maintained therapeutic gains through ongoing use of learned coping strategies in their daily lives. The sustainability of treatment effects is particularly important in chronic conditions such as migraine headaches, where long-term management and psychological adaptation are essential.

The present findings also have important theoretical implications. The study supports transdiagnostic models suggesting that experiential avoidance, emotional dysregulation, and psychological inflexibility are central mechanisms underlying chronic pain and emotional distress (16). By reducing avoidance and increasing acceptance of emotional and bodily experiences, ACT may simultaneously influence multiple psychological domains associated with migraine headaches. The results further reinforce the notion that emotional processing deficits such as alexithymia are modifiable psychological constructs rather than stable personality traits. This has important implications for clinical interventions targeting emotional functioning in chronic pain populations.

In addition, the findings highlight the close interrelationship between emotional functioning and pain adaptation in individuals with migraine headaches. Previous studies have shown that migraine is not merely a neurological condition but also a biopsychosocial disorder influenced by emotional, cognitive, and behavioral factors (1). Emotional suppression, stress sensitivity, maladaptive coping strategies, and low self-efficacy may contribute to the maintenance and exacerbation of migraine symptoms (23). Therefore, integrating psychological interventions such as ACT into multidisciplinary migraine treatment programs may improve both emotional well-being and functional outcomes.

One of the strengths of the present study is the use of a quasi-experimental design with a follow-up assessment, which allowed evaluation of both immediate and relatively sustained treatment effects. In addition, the simultaneous examination of alexithymia and pain self-efficacy provides a more comprehensive understanding of psychological changes associated with ACT in migraine patients. However, despite these strengths, the findings should be interpreted within the context of several limitations.

One limitation of the present study was the relatively small sample size, which may limit the generalizability of the findings to broader populations of individuals with migraine headaches. In addition, participants were selected from a specific geographical area and clinical settings, which may reduce external validity. Another limitation was the reliance on self-report instruments for measuring alexithymia and pain self-efficacy, as self-report measures may be influenced by response biases and subjective perceptions. Furthermore, the follow-up period was limited to two months, and longer-term effects of the intervention remain unclear. The absence of comparison with other active psychological interventions also limits conclusions regarding the relative superiority of ACT.

Future research is recommended to replicate the present study with larger and more diverse clinical samples and longer follow-up periods to evaluate the long-term stability of treatment outcomes. Future studies may also compare ACT with other evidence-based interventions such as cognitive behavioral therapy, mindfulness-based interventions, or emotion-focused therapies in migraine populations. In addition, examining potential mediating variables such as psychological flexibility, emotional regulation, pain catastrophizing, and mindfulness may provide a more detailed understanding of the mechanisms underlying treatment effectiveness. Researchers are also encouraged to investigate the effectiveness of ACT across different age groups and varying levels of migraine severity.

From a practical perspective, the findings suggest that Acceptance and Commitment Therapy may be incorporated into multidisciplinary treatment programs for individuals with migraine headaches. Mental health professionals and healthcare providers working with migraine patients may benefit from integrating ACT techniques such as mindfulness, emotional awareness training, acceptance exercises, and value-based behavioral activation into routine care. Educational workshops and psychological support programs aimed at improving emotional processing and strengthening pain self-efficacy may also contribute to better adaptation and quality of life among migraine sufferers. Additionally, collaboration between neurologists, psychologists, and rehabilitation specialists may enhance comprehensive migraine management and reduce the psychological burden associated with chronic headache disorders.

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Authors' Contributions

All authors equally contributed to this study.

Declaration of Interest

The authors of this article declared no conflict of interest.

Ethical Considerations

The study protocol adhered to the principles outlined in the Helsinki Declaration, which provides guidelines for ethical research involving human participants.

Transparency of Data

In accordance with the principles of transparency and open research, we declare that all data and materials used in this study are available upon request.

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