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Comparison of the Effectiveness of Acceptance and Commitment Therapy With and Without Compassion on the Psychological Pain Indicators of Patients With Chronic Tension Headaches

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A B S T R A C T

Objective: This study aimed to evaluate the effectiveness of Acceptance and Commitment Therapy (ACT) with and without compassion on the psychological pain indicators of patients.

Methods and Materials: This quasi-experimental study included a pretest-posttest design with a control group and a three-month follow-up. From the population of patients (chronic tension headaches) who visited the Senabad Neurology Center in Mashhad during the first quarter of 2023, 45 individuals meeting the inclusion criteria were selected through convenience sampling and randomly assigned to three groups (two experimental groups and one control group). All participants completed the research questionnaires before and after the group therapies. Additionally, the questionnaires were completed again by the participants after the three-month follow-up period.

Findings: The results indicate that Acceptance and Commitment Therapy, both with and without compassion, had significantly different effects on psychological pain indicators. The effectiveness of ACT with compassion in improving psychological pain indicators was significantly greater than ACT without compassion.

Conclusion: Acceptance and Commitment Therapy, with or without compassion, can be used to manage and control certain symptoms and signs of chronic tension headaches, such as enhancing and restoring psychological pain indicators in affected individuals.

Keywords: *Tension headache, Acceptance and Commitment Therapy, Compassion, Pain*

1. Introduction

Tension headaches are among the most common types of chronic pain (Sadeghi Nisiani et al., 2023). Studies indicate that more than 80% of individuals with tension headaches experience life disruptions due to their condition, with 60% reporting a significant reduction in work capacity. Furthermore, more than 12% of individuals with tension headaches are absent from work for at least one day or more (Bendtsen et al., 2018). Despite the persistent efforts of physicians to reduce the prevalence of this condition, none of the medical treatments alone have been able to significantly reduce pain or improve emotional and physical functioning. A meta-analysis revealed that even amitriptyline, one of the most common medical treatments for tension headaches, only reduced headaches in approximately 33% of cases (Moore et al., 2019). Therefore, not only are medications ineffective in fully treating and preventing pain, but they also cause side effects, prompting researchers to explore alternative therapeutic methods.

One of the therapies that has attracted the attention of psychotherapists in recent years and gained widespread support is Acceptance and Commitment Therapy (ACT). ACT is a form of psychotherapy that promotes the acceptance of negative thoughts, feelings, and events. This approach, introduced by Steven Hayes in 1982, is considered part of the third wave of behavioral therapy and is rooted in B. F. Skinner's radical behaviorism (Nicolescu et al., 2024; Roshandel et al., 2022; Shahkaram et al., 2024). The technique encourages individuals to consciously engage in activities that align with their core beliefs and values. Proponents of this psychotherapy technique argue that working on increasing acceptance can lead to greater psychological flexibility. Psychological flexibility refers to accepting thoughts as they arise and acting according to long-term values rather than short-term motivations. The therapeutic approach of ACT is based on a combination of mindfulness, acceptance, commitment, and behavior change, aiming to reach a stage where the individual no longer needs to eliminate a negative emotion, as efforts to remove symptoms of a disorder may exacerbate them. As a result, the therapy focuses on changing the individual's relationship with distressing emotions (A-Tjak et al., 2014; Cojocaru et al., 2024).

Another therapeutic method that has gained significant attention in recent years is Compassion-Focused Therapy (CFT). Its use has notably increased with the aim of improving psychological functioning and well-being (Kirby, 2017). Paul Gilbert (2017) introduced CFT to help individuals with low mood, shame, and self-criticism. The goal of this therapy is to emphasize the role of the kindness system in reducing threat-based processes by fostering a sense of care for the client. According to Gilbert, teaching individuals to cope with emotional distress through compassion will enhance their well-being (Gilbert, 2020).

Research evidence shows that self-compassion not only improves well-being and positive outcomes when individuals face negative life events (Zessin et al., 2017), but also effectively reduces traits such as self-criticism, shame, a sense of inferiority, depression, and anxiety (Neff et al., 2018). In other words, self-compassion improves psychological health in the long term (Finlay-Jones et al., 2017; Kashmari et al., 2024). "Self-compassion" refers to caring for and empathizing with oneself rather than adopting a harsh or critical view. Gilbert (2017) emphasizes that one way to reduce suffering is to cultivate compassion for oneself and others (Gilbert, 2020). Self-compassion involves kindness toward oneself and having a nonjudgmental understanding of one's flaws. It also involves being receptive to and influenced by the suffering of others in a way that makes one's own problems and sufferings more bearable. For someone with a chronic illness, self-compassion means maintaining a positive attitude toward oneself even when things do not go as desired. In fact, self-compassion is considered a protective trait and an effective factor in fostering emotional resilience (Kirby, 2017; Levy, 2024).

While research on both compassion and ACT shows that these two therapeutic methods are useful for addressing psychological problems (Hayes et al., 2019), some studies suggest that relying on a single type of therapy may not always be beneficial and effective. A singular focus can limit the understanding of human behavior and may result in the lack of improvement for many patients. Therefore, considering that ACT focuses primarily on language and cognition, while compassion-based approaches emphasize emotions, it is possible that integrating these two therapeutic methods—addressing cognition, language, and emotion—could lead to better outcomes for psychological well-being. A review of both domestic and international research indicates that no studies have yet been conducted on this topic. Given the high prevalence of individuals with headaches and the significant role psychological factors appear to play in the persistence and intensity of headaches, as well as the multifactorial nature of pain and the adverse consequences of neglecting the psychological and emotional components of individuals with headaches, which have

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widespread effects on their personal, social, and professional lives, there is a clear need for appropriate actions to improve both the psychological and physical components of these individuals.

2. Methods and Materials

2.1. Study Design and Participants

Given the research topic and objectives, the present study was a quasi-experimental study with a pretest-posttest control group design and a three-month follow-up. Initially, a pretest was administered to the selected groups, followed by the intervention and group-specific therapy. The control group did not receive any treatment to allow for comparison in the subsequent stages. A posttest was conducted, and a follow-up assessment was completed after one month. The study population included all patients with chronic headaches who visited the Senabad Neurology Clinic in Mashhad between May and June 2023. The researcher decided, based on sample size calculations (alpha = 0.05, effect size = 0.25, power = 0.80), to determine a minimum of 20 participants per group to achieve the desired statistical power. Thus, 60 patients with tension headaches were selected through convenience sampling from the patients attending the clinic and were randomly assigned to three groups of 20 based on attendance on odd or even days. The groups were matched based on gender, age, and education level. Both therapeutic methods (ACT and self-compassion therapy) were conducted in group sessions.

Inclusion criteria were an age range of 20 to 50 years, a diagnosis of chronic headache, and at least basic literacy skills. Exclusion criteria included receiving homeopathy or other psychological interventions in the past year, concurrent chronic illnesses or pain, unwillingness to participate or inability to understand the therapy process, which could hinder psychotherapy progress and negatively impact other group members, and dealing with unusual life stressors such as family disputes, divorce, or substance abuse history.

After selecting the sample based on the study's inclusion and exclusion criteria, 60 individuals were chosen from the accessible population and randomly assigned to three groups: ACT, self-compassion therapy, and the control group. The control group received only drug therapy as prescribed by their treating physician. The second group received ACT in addition to drug therapy, and the third group received ACT combined with compassion therapy alongside drug therapy. Since the researcher aimed to "compare the effectiveness of ACT with and without compassion on the psychological pain indicators, psychological symptoms, and sleep quality of patients with chronic tension headaches," the research design was structured as a three-group (two experimental and one control) pretest-posttest study.

Among the selected participants, individuals in the experimental groups completed all items of the study questionnaires before and after the therapy sessions, along with demographic questions. To ensure ethical compliance, the researcher voluntarily committed to providing these interventions to the control group after the study's completion.

2.2. Measures

2.2.1. Pain Indicators

The Pain Catastrophizing Scale (PCS) consists of 13 items and is designed to assess the degree of catastrophic thinking related to pain in men. Sullivan and colleagues believe that catastrophizing about pain is one of the main mechanisms for eliciting worry and supportive responses from others. Pain catastrophizing is recognized as an important cognitive-emotional variable in the perception of pain. Moreover, it is considered a negative, catastrophic variable that, through rumination, magnification, and helplessness toward painful processes, leads to an inability to control pain. This questionnaire uses a Likert scale (not at all = 1, somewhat = 2, moderately = 3, a lot = 4, all the time = 5). In Sullivan et al.'s research, rumination accounted for 41% of the total variance, magnification accounted for 10%, and helplessness accounted for 8% of the total variance. The alpha coefficients for the rumination, magnification, and helplessness subscales were 0.87, 0.60, and 0.79, respectively, with an overall scale alpha of 0.87 (Hooshmandi et al., 2024; Sayed Alitabar & Goli, 2023).

2.3. Interventions

2.3.1. Acceptance and Commitment (ACT)

The ACT intervention, based on Hayes and Strosahl's (2019) protocol, aims to enhance psychological flexibility by encouraging participants to accept their thoughts and feelings rather than avoid or control them. The sessions focus on understanding personal experiences and developing acceptance through metaphors, mindfulness, and committed action. The intervention consists of eight sessions, each targeting specific components of the ACT model such as cognitive defusion, acceptance, contact with the present

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moment, and value-based living (Harris, 2019; Hayes et al., 2019).

Session 1

In the first session, participants are introduced to each other, the research topic, and the therapeutic process. The facilitator provides general information about chronic tension headaches, establishes the treatment contract, and conducts the pre-test.

Session 2

This session reviews the content from the previous meeting and assesses the participants' experiences with previous therapeutic methods using metaphors. Feedback is collected from participants, and they are assigned homework.

Session 3

Participants review the previous session, and the therapist helps them recognize attempts to control personal events and encourages them to accept painful personal experiences without struggle or control. Metaphors are used to facilitate this process, and feedback is gathered.

Session 4

The focus of this session is on understanding the consequences of avoiding painful experiences and becoming aware of avoidance patterns. Participants are guided toward acceptance as a means of addressing avoidance, with feedback and homework provided.

Session 5

This session introduces steps for changing language concepts using metaphors, along with relaxation techniques. Participants practice these techniques and receive feedback on their progress.

Session 6

Building on the previous session, the concept of self as context is introduced. Participants learn to observe themselves without judgment using metaphors. Feedback is collected, and homework is assigned.

Session 7

The therapist introduces the concept of values, exploring personal goals and needs, and works to motivate participants toward change. Mindfulness exercises focusing on breathing and environmental sounds are practiced. Feedback and homework are provided.

Session 8

In the final session, the focus is on commitment to action. The therapist reviews the participants' progress, discusses the results of the therapy sessions, and conducts a post-test.

2.3.2. Compassion-Focused ACT (CFACT)

This intervention integrates ACT principles with Compassion-Focused Therapy (CFT), based on the protocols of Hayes (2008) and Gilbert (2009). The aim is to promote self-compassion alongside acceptance, enhancing emotional resilience and well-being. The sessions combine mindfulness with compassionate exercises, teaching participants to accept their pain with kindness rather than judgment (Gilbert, 2020; Hayes et al., 2019).

Session 1

Participants are introduced to each other, and the pre-test is administered. The therapist explains the goals of the group and introduces ACT and self-compassion. The "two mountains" metaphor and a brief mindfulness exercise are introduced, followed by feedback and homework.

Session 2

This session focuses on compassionate mindfulness and observing thoughts without judgment. The therapist reviews the creative hopelessness exercises and explains the characteristics of emotional systems (threat, drive, and soothing). Homework is assigned to practice compassionate mindfulness.

Session 3

Participants review the previous session, and the therapist helps them understand the control of personal events through compassionate mindfulness. The concept of clean and dirty pain is introduced in relation to emotional systems, along with the brain's three functions (old brain, analytical brain, and aware brain). The session ends with feedback and homework.

Session 4

The therapist discusses the avoidance of painful experiences and the outcomes of such avoidance. Participants are guided through compassionate mindfulness, focusing on their sensitivity to their own suffering. Techniques of defusion and the "passengers on the bus" metaphor are introduced. The ACT hexagon is drawn to explain the therapy's structure.

Session 5

Participants are taught compassionate steps through metaphors and practice acts of kindness toward themselves and others. Exercises in empathy and compassion, such as the "flashlight" metaphor, are introduced. The values concept is discussed using the "bad cup" metaphor, followed by feedback and homework.

Session 6

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This session reviews the compassionate mindfulness exercises and their application in daily life. Participants work on ranking their values, committing to action, and understanding roles and contexts, using metaphors like the "chessboard" to explore different aspects of the self. Feedback is gathered.

Session 7

Compassionate mindfulness is expanded through imagery focused on gentleness, love, care, and acceptance. Participants are encouraged to write a compassionate letter to themselves or others and practice forgiveness. A compassionate goal aligned with their values is set for the week.

Session 8

In the final session, participants practice mindfulness using colors, sounds, and compassionate imagery. The therapist reviews the use of ACT and compassion in daily life and guides participants through the process of aligning their actions with their values. The session concludes with a group discussion and the administration of the post-test.

2.4. Data analysis

Descriptive statistical methods included frequency calculation, percentage, mean, standard deviation, Levene's test, Kolmogorov-Smirnov test, regression slope test, and multivariate covariance analysis with repeated measures using SPSS 22. The significance level for this study was set at 0.05.

3. Findings and Results

The descriptive findings of the present study, including the mean and standard deviation of the research variables in the ACT with Compassion group, the ACT without Compassion group, and the control group, are presented in Table 1 for both pretest and posttest phases.

Table 1

Descriptive Statistics for the Research Variables Across Pretest, Posttest, and Follow-up Stages

Variable	Group	Pretest (M ± SD)	Posttest (M ± SD)	Follow-up (M ± SD)
Pain Catastrophizing	ACT with Compassion Group	50.26 ± 5.63	35.06 ± 5.24	33.24 ± 4.96
	ACT without Compassion Group	49.86 ± 4.65	38.53 ± 4.91	37.12 ± 4.77
	Control Group	49.93 ± 4.18	48.73 ± 2.98	48.32 ± 3.21
Pain Acceptance	ACT with Compassion Group	56.93 ± 8.85	74.66 ± 9.23	76.12 ± 8.97
	ACT without Compassion Group	57.66 ± 8.97	72.06 ± 9.15	71.84 ± 8.86
	Control Group	58.06 ± 7.63	59.73 ± 6.38	59.92 ± 6.41
Pain Anxiety	ACT with Compassion Group	88.06 ± 9.91	69.93 ± 9.14	68.34 ± 8.67
	ACT without Compassion Group	86.33 ± 11.63	73.46 ± 11.45	72.18 ± 10.93
	Control Group	87.86 ± 8.11	86.26 ± 8.26	85.94 ± 8.12

The interaction between the covariate (pretest pain catastrophizing) and the dependent variable (posttest pain catastrophizing) across the factor levels (experimental and control groups) was not significant, $F(1, 60) = 1.705$, $p = .195$. Therefore, the assumption of homogeneity of regression for pretest and posttest pain catastrophizing across the factor levels is confirmed. Similarly, the interaction between the covariate (pretest pain acceptance) and the dependent variable (posttest pain acceptance) across the factor levels was not significant, $F(1, 60) = 2.165$, $p = .128$. The assumption of homogeneity of regression for pretest and posttest pain acceptance across the factor levels is also confirmed. Lastly, the interaction between the covariate (pretest pain anxiety) and the dependent variable (posttest pain anxiety) across the factor levels was not significant, $F(1, 60) = 0.678$, $p = .514$.

To examine and compare the effectiveness of ACT with and without compassion on the psychological pain indicators of patients with chronic tension headaches, a multivariate analysis of covariance (MANCOVA) was conducted. The results of the MANCOVA are presented in Table 2.

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Table 2

Summary of Multivariate Analysis of Covariance (MANCOVA) for Comparing the Mean Posttest Scores of the Dependent Variables in Experimental and Control Groups

Effect	Test	Value	F	df Hypothesis	df Error	p	Effect Size
Group	Pillai's Trace	1.225	6.769	14	60	.001	.612
	Wilks' Lambda	.012	32.951	14	58	.001	.888
	Hotelling's Trace	60.161	120.322	14	56	.001	.968
	Roy's Largest Root	59.843	256.472	7	30	.001	.984

As shown in Table 2, there is a significant difference between the ACT with Compassion group, the ACT without Compassion group, and the control group in the posttest phase for at least one of the variables—pain catastrophizing, pain acceptance, or pain anxiety ($F = 32.951$, $p < .001$). To further investigate the specific differences, a univariate analysis of covariance (ANCOVA) was conducted for pain catastrophizing, pain acceptance, and pain anxiety. The results are presented in Table 3.

Table 3

Results of Univariate Analysis of Covariance (ANCOVA) for Comparing Posttest Scores of Dependent Variables in Experimental and Control Groups

Source of Variables	Sum of Squares	df	Mean Square	F	p	Effect Size
Pain Catastrophizing	1410.420	2	705.210	108.929	.001	.862
Pain Acceptance	1943.151	2	971.576	161.096	.001	.902
Pain Anxiety	1978.437	2	989.218	82.944	.001	.826

As indicated in Table 3, the F ratio for the univariate ANCOVA of pain catastrophizing was significant ($F = 108.929$, $p < .001$). This finding indicates that there was a significant difference in pain catastrophizing between the ACT with Compassion group, the ACT without Compassion group, and the control group. To explore these differences further, Bonferroni post hoc tests were performed to compare the adjusted means of pain catastrophizing among the three groups. The results are shown in Table 4.

Table 4

Bonferroni Post Hoc Test Results for Comparing Adjusted Means of Pain Catastrophizing in Experimental and Control Groups

Variable	Comparison Groups	Mean Difference	p
Pain Catastrophizing	ACT with Compassion – Control	-13.806	.001
	ACT without Compassion – Control	-9.767	.001
	ACT with Compassion – ACT without Compassion	-4.039	.001
Pain Acceptance	ACT with Compassion – Control	15.800	.001
	ACT without Compassion – Control	12.537	.001
	ACT with Compassion – ACT without Compassion	3.263	.003
Pain Anxiety	ACT with Compassion – Control	-16.404	.001
	ACT without Compassion – Control	-11.382	.001
	ACT with Compassion – ACT without Compassion	-5.022	.001

As shown in Table 4, the results suggest that ACT without Compassion was effective in reducing pain catastrophizing in patients with chronic tension headaches. Moreover, ACT with Compassion was more effective in reducing pain catastrophizing than ACT without Compassion. Similarly, ACT with Compassion significantly improved pain acceptance in patients with chronic tension headaches. Additionally, ACT with Compassion was more effective than ACT without Compassion in improving pain acceptance. Finally, ACT with Compassion significantly

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reduced pain anxiety in patients with chronic tension headaches, and ACT without Compassion was also effective in reducing pain anxiety. However, ACT with Compassion was more effective than ACT without Compassion in reducing pain anxiety.

4. Discussion and Conclusion

Acceptance and Commitment Therapy (ACT) with compassion had a significant effect on the psychological pain indicators (pain catastrophizing) of patients with chronic tension headaches. According to studies by Kabat-Zinn (2017), the use of mindfulness processes can create significant changes in how individuals utilize their attention. Mindfulness exercises focus on the self, allowing individuals to observe their mental events rather than considering them as part of their identity. Those who catastrophize their pain often adopt a judgmental view and do not consider their problems from multiple perspectives. They tend to have a harsh view of themselves. Engaging in effective contact with the present moment and addressing the self-concept helped shift their thought patterns. In the therapy sessions, techniques of mindfulness and the observer self were introduced, directing participants' attention to their thoughts and mental states, as well as to being present in the moment. This effect was visible in the posttest and follow-up scores of the experimental group.

Another factor contributing to the effectiveness of compassion-based therapy is assertive behavior and mindfulness, which enhance self-control, self-awareness, and focus. As individuals increase their awareness and understanding of their behavior, they gain better insight, leading to an increase in appropriate behavior and a decrease in inappropriate behavior (Germer & Neff, 2019). Moreover, this type of therapy teaches patients to reflect on their emotional and motivational states, practicing and reinforcing changes, allowing them to approach life's pains with wisdom. Mindfulness and compassion exercises help clients face their challenges compassionately and develop more effective methods for regulating emotions and dealing with challenging emotional situations. In a study by Gilbert (2020), it was found that self-compassion helps individuals manage difficult moments, failures, and mistakes with kindness toward themselves and others. Self-compassion exercises transform the inner critic into an inner supporter, providing self-comfort and calm (Kelly et al., 2020).

There is a significant difference in the effectiveness of ACT with and without compassion on psychological pain indicators (pain catastrophizing) in patients with chronic tension headaches. The results suggest that ACT with compassion was more effective than ACT without compassion in reducing pain catastrophizing. Tension headaches are a common type of headache that frequently recurs, significantly disrupting patients' lives. When individuals with this condition undergo ACT with compassion, they are encouraged to accept negative thoughts, feelings, and events, reducing pain catastrophizing due to increased acceptance. This therapy promotes conscious participation in activities that align with their core beliefs and values, fostering greater psychological flexibility and reducing pain catastrophizing. Compassion also improves mood, reduces shame and self-criticism, and activates the kindness system, further decreasing pain catastrophizing. According to Gilbert (2020), teaching individuals to cope with emotional distress through compassion enhances their well-being (Gilbert, 2020). Self-compassion improves well-being and leads to positive outcomes when facing life's negative events (Zessin et al., 2017) and also reduces traits such as self-criticism, shame, inferiority, depression, and anxiety (Harris, 2019). In the long term, self-compassion enhances psychological well-being (Finlay-Jones et al., 2017), leading to increased self-care, understanding, and empathy, which reduces pain catastrophizing. Conversely, individuals who underwent ACT without compassion experienced more pain catastrophizing than those who received ACT with compassion.

There is also a significant difference in the effectiveness of ACT with and without compassion on psychological pain indicators (pain acceptance) in patients with chronic tension headaches. The results indicate that both treatments, compared to the control group, increased patients' acceptance of pain, with ACT with compassion being more effective than ACT without compassion. Tension headaches, when recurrent, significantly disrupt patients' lives. ACT with compassion promotes the acceptance of negative thoughts, feelings, and events, increasing pain acceptance through the acceptance of these thoughts. The therapy encourages individuals to engage consciously in activities that align with their core values, promoting greater psychological flexibility and pain acceptance. In contrast, individuals who underwent ACT without compassion experienced lower pain acceptance compared to those who received ACT with compassion.

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5. Limitations & Suggestions

The results of this study pertain to patients with chronic tension headaches, and therefore, generalizing the results to other conditions should be done with caution. Family, environmental, and cultural factors were not controlled in this study, so generalization to patients with chronic headaches from different socioeconomic and cultural backgrounds should be approached carefully. Since this study was conducted on patients with chronic tension headaches, it is suggested that similar research be conducted on other patient groups, and the results compared to gain a deeper understanding of the effectiveness of ACT with and without compassion on psychological pain indicators. Future research should also explore these therapies in different cultural contexts to enhance the generalizability of the findings. Given the positive effects of both treatments, it is recommended that educational sessions be held for doctors and nurses working with these patients, enabling them to refer patients to psychological sessions with specialists when appropriate.

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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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Authors' Contributions

All authors equally contributed in this article.

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