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Effectiveness of Acceptance and Commitment Therapy (ACT) on Pain Perception and Acceptance in End-Stage Cancer Patients

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ABSTRACT

Objective: This study examined the effectiveness of ACT on pain perception and pain acceptance in end-stage cancer patients.

Methods and Materials: A quasi-experimental design with pre-test, post-test, and follow-up stages was used. Thirty end-stage cancer patients at Imam Khomeini Hospital in Tehran were selected via convenience sampling and randomly assigned to experimental (n=15) and control (n=15) groups. The intervention group received eight weekly ACT sessions based on Hayes et al.'s protocol, while the control group was placed on a waitlist. Pain perception and acceptance were assessed using the McGill Pain Questionnaire (MPQ). Data were analyzed using repeated measures ANOVA via SPSS version 24.

Findings: There was a statistically significant group-by-time interaction in pain perception and acceptance ($F=26.83$, $p<0.001$), indicating that ACT led to notable improvements in the experimental group. No significant changes were observed in the control group. The intervention effects remained stable at follow-up.

Conclusion: ACT appears to be an effective intervention for improving pain perception and acceptance in End-Stage Cancer Patients. These findings highlight the value of integrating ACT into palliative care to enhance psychological adaptation and quality of life in this vulnerable population.

Keywords: Acceptance and Commitment Therapy, pain perception, pain acceptance, cancer.

Introduction

Cancer begins with the uncontrolled growth and spread of abnormal cells in the body. Despite medical advancements, it is still perceived by most people as a fatal and inevitably deadly disease (Lippi, 2025; Matthews, 1998). The International Agency for Research on Cancer has reported that cancer and its treatment have significant effects on patients, leading to a decline in their physical and psychological functioning. Some of the most common symptoms include high prevalence of pain, fatigue, weakness, loss of appetite, lower quality of life, and psychological impairment (Lewandowska et al., 2020).

Cancer patients often worry about their survival while enduring severe pain, which can profoundly impact their psychological well-being. It is widely recognized that cancer is not merely a condition with a definitive endpoint; rather, it is a continuous and significant situation characterized by long-term and delayed effects of the disease, its treatment, and related psychological challenges (Mehrabi et al., 2024).

In comparison to the general population, cancer patients are at a higher risk of developing psychological disorders. In fact, the diagnosis and treatment of cancer can reduce patients' mental health, leading to symptoms of depression and anxiety (Yen et al., 2024). One of the key variables influencing diseases, especially cancer, is the perception of pain and the level of social support patients receive from their families and surroundings. Both of these factors play a crucial role in enhancing quality of life, health, and the coexistence of patients with chronic pain. Pain perception is a multidimensional experience that can be examined across three dimensions: sensory, affective, and evaluative. The sensory dimension refers to aspects such as time, location, pressure, and other sensory qualities of the pain experience. The affective dimension reflects stress, fear, and autonomic system responses associated with pain. The evaluative dimension represents the subjective intensity of the overall pain experience (VESAL et al., 2015).

The way a patient perceives their pain, particularly in cases of severe pain, can significantly affect their coping mechanisms. Chronic pain is one of the most critical medical challenges worldwide (Rost et al., 2016), affecting millions of people each year without effective treatment. Severe pain is one of the leading causes of

human suffering and disability worldwide, significantly impacting individuals' quality of life (Loeser, 2001). Many chronic pain patients experience varying degrees of disability in their daily activities (Asghari & Nicholas, 2009). Chronic pain induces numerous changes in the daily lives of affected individuals, and if the root cause of the pain cannot be cured, addressing its psychological consequences, such as negative emotions, may at least reduce its overall impact on the patient and their life. Additionally, accepting the nature of their condition over time may improve their functional capacity (Nicholas & Blyth, 2016).

Pain acceptance can be explained through the Acceptance and Commitment Therapy (ACT) approach. ACT is a psychological intervention that seeks to replace avoidance of experiences with a willingness to accept them. This therapy is a functional contextual intervention based on Relational Frame Theory (RFT), which attributes human suffering to psychological inflexibility reinforced by cognitive fusion and experiential avoidance (Hayes et al., 2011). Psychological flexibility, which is the ultimate goal of ACT interventions, includes skills such as acceptance, cognitive defusion, self-as-context, and mindfulness. These skills help individuals move away from avoidance and suppression of internal experiences and instead develop an ability to accept and observe mental events. (Robbins, 2012) found that mindfulness-based interventions reduce fear of emotions and suppression of anger. Additionally, research by (Azkhosh & Asgari, 2014) demonstrated the effectiveness of ACT in emotional regulation.

ACT helps clients identify what truly matters to them and encourages them to use these values to guide behavioral changes in their lives. Rather than directly altering thoughts and emotions, ACT-based interventions aim to expand individuals' behavioral repertoire to respond flexibly and adaptively to distressing experiences. Numerous studies have shown that such approaches effectively reduce anxiety symptoms and mood disorders (Leahy et al., 2011; translated by Mansouri Rad, 2013).

According to previous research, ACT has been an effective treatment for post-traumatic stress disorder (Nutt et al., 2009), generalized anxiety disorder (Roemer et al., 2008), mood disorders (DeRubeis et al., 2016;

Zettle, 2004; Zettle et al., 2011) (Zettle & Hayes, 1986), phobias (Levitt et al., 2004) (García-López et al., 2001), and schizophrenia (Bach & Hayes, 2002). Additionally, ACT has been beneficial in reducing occupational stress (Bond & Bunce, 2003) and alleviating stress and anxiety experienced by parents of children with intellectual disabilities (Blackledge & Hayes, 2006). Furthermore, ACT has been shown to reduce depression (Zettle & Hayes, 1987) and anxiety in cancer patients (Arch & Mitchell, 2016). However, there is a gap in research examining the variables of pain acceptance, pain perception, and the effectiveness of ACT in these areas. Therefore, this study aims to answer the question: How effective is Acceptance and Commitment Therapy (ACT) in improving pain perception and acceptance in End-Stage Cancer Patients?

Methods and Materials

Research Design

This study employed a quasi-experimental, pre-test, post-test, and follow-up design with a control group. The primary objective was to evaluate the effectiveness of Acceptance and Commitment Therapy (ACT) in improving pain perception and pain acceptance among patients with end-stage cancer.

Participants and Sampling

The study population included all patients diagnosed with end-stage cancer and undergoing treatment at Imam Khomeini Hospital in Tehran. Using a convenience sampling method, 30 eligible patients were selected based on the following inclusion criteria: (1) confirmed diagnosis of end-stage cancer by an oncologist, (2) ability to read and write, (3) age above 18, and (4) willingness to participate in all sessions and assessments. Exclusion criteria included: (1) withdrawal from the intervention before completion, and (2) concurrent participation in

other psychological treatment programs. Participants were then randomly assigned to either the experimental (n = 15) or control group (n = 15) using a computer-generated randomization sequence conducted by an independent researcher to ensure allocation concealment.

Instruments

McGill Pain Questionnaire (MPQ)

The McGill Pain Questionnaire (MPQ) was developed by Melzack and Torgerson in 1971 as a comprehensive tool for assessing pain using lexical analysis of words describing pain (Melzack et al., 1983). This questionnaire measures pain perception across four dimensions: sensory pain, affective pain, pain evaluation, and various pain descriptors. The MPQ consists of 20 sets of words categorized into three dimensions, as detailed below: Participants select words that best describe their current pain experience, with intensity scores assigned based on the hierarchical arrangement of the words. Dworkin et al., (2009) confirmed the validity of this questionnaire, while its reliability was measured using Cronbach's alpha. The reliability coefficient for all dimensions ranged from 0.83 to 0.87.

Intervention Protocol

The experimental group participated in eight weekly ACT sessions, each lasting 90 minutes. The therapy was delivered in group format based on the standard ACT protocol developed by (Hayes et al., 2011), with minor cultural adaptations for Persian-speaking patients. The intervention emphasized the six core processes of ACT: acceptance, cognitive defusion, being present, self-as-context, values clarification, and committed action. The intervention was conducted in group therapy sessions (Table 1).

Table 1

Acceptance and Commitment Therapy (ACT) Protocol

Session	Content
Session 1	Review and assessment of the patient's history and problem evaluation, introduction of treatment goals and the concept of change, explanation of the ACT-based intervention philosophy, establishing a consultation agreement (commitment to timely attendance and completion of assignments).
Session 2	Examining the interaction between thoughts, emotions, and actions, creating dissatisfaction with previously used coping strategies, clarifying personal values.
Session 3	Practicing value clarification, emphasizing awareness, mindfulness exercises, continuation of value clarification.
Session 4	Awareness of emotions through discussion, identifying obstacles to value-driven activities, an introduction to effective goal setting, exercises on life satisfaction and dissatisfaction.
Session 5	Awareness of bodily sensations with discussion.
Session 6	Continued focus on effective goal setting, breathing awareness exercises with minimal guidance from the therapist.
Session 7	Discussion on stages of activity and behavioral cycles, continued discussion on acceptance of suffering, mindfulness exercises while walking.

Session 8 Practicing value clarification and motivation-driven activities (committed action), integrating goal-oriented activity with acceptance of mental experiences.

Procedure

Following ethical approval and participant recruitment, 30 eligible patients diagnosed with end-stage cancer were enrolled in the study. After obtaining written informed consent, participants completed the baseline (pre-test) assessment, which included the McGill Pain Questionnaire (MPQ) to evaluate pain perception and acceptance. Subsequently, participants were randomly assigned to either the experimental group ($n = 15$), which received the ACT intervention, or the control group ($n = 15$), which was placed on a waitlist. Randomization was carried out using a computer-generated list by an independent researcher to minimize selection bias.

The experimental group attended eight weekly sessions of Acceptance and Commitment Therapy (ACT), each lasting approximately 90 minutes. The sessions were conducted in small groups at the hospital's psychology clinic and facilitated by a trained clinical psychologist under supervision. The ACT protocol followed the core components developed by Hayes et al., (2011), including acceptance, mindfulness, cognitive defusion, and values-based committed action. Homework assignments and experiential exercises were incorporated into each session to enhance therapeutic engagement and real-life application. The control group did not receive any psychological treatment during the intervention phase but was assured of future access to ACT following the study's completion.

Both groups were reassessed at the conclusion of the intervention (post-test) and again four weeks later (follow-up), using the same instrument (MPQ) under consistent conditions. All data collection was administered in person by a research assistant who was blinded to group allocation to reduce potential assessment bias. Data were coded to maintain participant confidentiality.

Data Analysis

Data analysis was performed in two formats: descriptive and inferential. The descriptive analysis

included measures such as standard deviation, mean, and graphical representations. For inferential analysis, repeated measures ANOVA was conducted while ensuring adherence to necessary assumptions. Data were analyzed using SPSS version 24. The repeated measures ANOVA method was employed to examine the interaction effect between the between-subjects factor (group) and the within-subjects factor (time) on pain perception and acceptance. Before applying this statistical method, Mauchly's test of sphericity was conducted to confirm the homogeneity of variances and similarity in correlation coefficients between within-subject factor levels.

Ethical Considerations

All participants provided written informed consent after being briefed on the study objectives, procedures, and confidentiality protocols. Participants were assured of their right to withdraw at any time without any consequences to their treatment.

Findings and Results

The study sample consisted of 30 patients with end-stage cancer, including 16 females (53.3%) and 14 males (46.7%), with a mean age of 52.6 years ($SD = 9.8$), ranging from 35 to 68 years. The two groups (experimental and control) were comparable in terms of gender distribution, age, and disease duration. There were no significant demographic differences between the groups at baseline, ensuring group equivalence before intervention. Table 2 presents the mean and standard deviation (SD) scores of pain perception and acceptance for both the experimental and control groups across three time points: pre-test, post-test, and follow-up.

Table 2*Mean and Standard Deviation of Pain Perception and Acceptance Scores by Group and Time*

Group	Time Point	Mean (M)	Standard Deviation (SD)
Experimental	Pre-test	56.26	13.94
	Post-test	69.26	14.83
	Follow-up	68.21	15.02
Control	Pre-test	53.00	7.40
	Post-test	53.66	7.29
	Follow-up	52.42	7.86

As shown, the experimental group exhibited a noticeable increase in pain perception and acceptance following the ACT intervention, with the effect sustained at follow-up. In contrast, the control group showed no meaningful change across the three time points. Mauchly's test of sphericity indicated that the

assumption of sphericity was met: $W = 0.943$, $\chi^2(6) = 0.851$, $p = .724$. Levene's test showed no significant differences in variance between groups at any time point. To assess the normality of the scores, the results of the Shapiro-Wilk test are presented in [Table 3](#).

Table 3*Assessment of the Normality of the Research Variables Using the Shapiro-Wilk Test*

Variable	Group	Shapiro-Wilk Value	df	P-value
Pretest	Experimental	0.897	15	0.065
	Control	0.823	15	0.039
Posttest	Experimental	0.761	15	0.087
	Control	0.792	15	0.056
Follow-up	Experimental	0.691	15	0.062
	Control	0.712	15	0.071

Based on the test results, since the p-values for both groups are not significant at the 0.05 level, the assumptions of normal distribution and homogeneity of within-group variances are met. To examine the effect of

the ACT intervention over time, a two-way repeated measures ANOVA was conducted. Results are presented in [Table 4](#).

Table 4*Repeated Measures ANOVA for Pain Perception and Acceptance*

Source	SS	df	MS	F	P	Partial η^2
Group	658.48	1	658.48	26.83	0.001	0.49
Time	555.02	2	277.51	22.61	0.001	0.45
Group $\times$ Time	377.16	2	188.58	17.31	0.001	0.38
Error (within)	687.15	56	12.27			

The results indicate a statistically significant main effect for group, main effect for time, and a significant interaction effect between time and group. These

findings demonstrate that ACT significantly improved pain perception and acceptance over time, and this effect was specific to the experimental group.

Table 5*Bonferroni-Adjusted Pairwise Comparisons for Pain Perception and Acceptance (Experimental Group)*

Comparison	Mean Difference (M)	Std. Error	p-value
Pre-test vs. Post-test	-13.00	2.31	< .001
Pre-test vs. Follow-up	-11.95	2.41	< .001
Post-test vs. Follow-up	1.05	2.18	.762

Table 5 indicates that there was a statistically significant increase in pain perception and acceptance from pre-test to both post-test and follow-up. The non-significant difference between post-test and follow-up suggests that the therapeutic effect of ACT was sustained over the 4-week follow-up period, without meaningful decline.

Discussion and Conclusion

The present study investigated the effectiveness of Acceptance and Commitment Therapy (ACT) in enhancing pain perception and pain acceptance among patients with end-stage cancer. The results indicated a statistically significant improvement in the experimental group's scores on pain perception and acceptance following the ACT intervention, with sustained effects observed at the four-week follow-up. In contrast, the control group exhibited no meaningful changes over time. These findings support the hypothesis that ACT is an effective psychological intervention for improving pain-related outcomes in terminally ill cancer patients.

The significant effect observed in this study aligns with previous research that highlights the therapeutic impact of ACT in chronic illness and cancer populations. For example, (Feros et al., 2013) found that ACT significantly improved quality of life and emotional wellbeing in cancer patients by promoting psychological flexibility. Similarly, (Rost et al., 2016) reported that ACT reduced distress and increased acceptance in patients with chronic pain conditions. These findings suggest that ACT's core processes—such as acceptance of internal experiences, mindfulness, and values-based action—play a critical role in enhancing coping mechanisms in the context of severe pain and psychological distress.

ACT's theoretical foundation, grounded in Relational Frame Theory (RFT), conceptualizes suffering as a result of experiential avoidance and cognitive fusion (Hayes et al., 2011). By reducing patients' attempts to control or suppress painful thoughts and sensations, ACT fosters a more adaptive relationship with internal experiences. This therapeutic stance is particularly relevant for end-stage cancer patients, who often experience unavoidable physical suffering accompanied by existential and emotional distress (Arch et al., 2022). The intervention helps patients shift from struggling with pain to accepting it as part of their lived reality, thereby

enhancing functionality and meaning even in the face of deterioration.

Moreover, the stability of treatment effects at follow-up supports ACT's long-term potential. The lack of significant change between post-test and follow-up suggests that patients retained the skills and insights developed during therapy, such as observing pain mindfully and pursuing valued actions despite discomfort. This durability is consistent with evidence from meta-analyses showing that ACT effects are often sustained over time (A-Tjak et al., 2018).

These findings have important implications for clinical practice. Given the high prevalence of pain and psychological distress in advanced cancer, incorporating ACT into palliative care protocols may enhance patient outcomes beyond pharmacological pain management. Training oncology psychologists and palliative care professionals in ACT can equip them with tools to support patients' psychological resilience and existential adjustment. Furthermore, group-based ACT delivery, as used in this study, may offer a scalable and cost-effective format in clinical oncology settings (Graham et al., 2016).

Several limitations should be acknowledged. First, the use of convenience sampling limits the generalizability of the results to broader cancer populations. Second, the study lacked an active control group, such as a psychoeducation or supportive counseling condition, which would help isolate the specific effects of ACT. Third, the relatively short follow-up period (four weeks) restricts understanding of the intervention's long-term effectiveness. Finally, the sample was limited to patients from a single hospital in Tehran, and the cultural applicability of ACT across diverse contexts warrants further exploration.

This study provides empirical support for the efficacy of Acceptance and Commitment Therapy in improving pain perception and acceptance among patients with end-stage cancer. ACT offers a psychologically flexible approach that empowers patients to engage more meaningfully with life despite the presence of pain. Future research should aim to replicate these findings in larger and more diverse populations, extend follow-up periods, and compare ACT with other evidence-based psychological interventions. Integrating ACT into multidisciplinary cancer care may enhance both the psychological and existential dimensions of end-of-life treatment.

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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. Ethical considerations in this study were that participation was entirely optional.

contribute to this study.

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