



Evaluating the Effectiveness of Acceptance and Commitment Therapy in Reducing Pain Intensity among Women with Breast Cancer

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ARTICLE INFO	ABSTRACT
<p>Article History: Received 12 April 2022 Received in revised form 14 May 2022 Accepted 26 August 2022 Available online 4 September 2022</p>	<p>The present study aimed to investigate the effectiveness of Acceptance and Commitment Therapy (ACT) on pain levels in women with breast cancer, a population often experiencing chronic pain and psychological distress due to the disease and its treatments. The study employed a single-case experimental design to provide an in-depth analysis of therapeutic outcomes. Two female patients diagnosed with breast cancer and meeting the inclusion criteria were recruited from Imam Hossein Hospital, Tehran. Each participant underwent eight structured ACT sessions, each lasting approximately 2.5 hours. The intervention emphasized acceptance of unpleasant internal experiences, cognitive defusion, mindfulness techniques, and clarification of personal values to enhance psychological flexibility and adaptive coping. Pain intensity was assessed with the McGill Pain Questionnaire (MPQ) at multiple time points: baseline (pre-treatment), mid-treatment (sessions 2, 4, and 6), post-treatment (session 8), and a two-month follow-up. Data were analyzed using graphical representation to examine individual patterns of change. Findings revealed a clinically significant reduction in pain intensity across treatment and sustained improvements during follow-up for both participants. These results suggest that ACT, by promoting adaptive attitudes toward pain, enhancing coping strategies, and reducing experiential avoidance, can be considered an effective complementary psychological intervention for pain management in women with breast cancer.</p>
<p>Keywords: Acceptance and Commitment Therapy, Breast Cancer, Cancer-Related Pain</p>	

1. INTRODUCTION

Cancer is not merely a discrete event with a defined endpoint but rather a chronic and ambiguous condition characterized by long-term and delayed effects of the disease, its treatment, and associated psychological issues [1]. Breast cancer accounts for 16% of all cancers in women and is the most common cancer in women after lung cancer, representing 10.9% of cases worldwide [2]. Perry and Chang reported that approximately one in eight women is

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affected by breast cancer [3]. Furthermore, the onset age of breast cancer in Iran is approximately ten years earlier than in developed countries [4]. According to the latest statistics from the Cancer Research Center of Shahid Beheshti University of Medical Sciences, the incidence of breast cancer in Iranian women is 27.5 per 1,000 individuals [5].

Cancer is among the most significant conditions causing pain [6]. Pain is one of the most common complications of malignancy and its treatment. It can manifest to varying degrees during cancer surgery, chemotherapy, radiotherapy, and hormone therapy [7]. Thousands of cancer patients, both in hospitals and at home, suffer from severe pain caused by the disease [8], with 20% to 90% of all patients experiencing varying levels of pain [9]. Although some pharmacological treatments offer moderate relief, psychological interventions such as cognitive-behavioral therapy (CBT) and mindfulness-based therapies have been clinically shown to significantly improve pain symptoms in most patients [10]. Additionally, psychosocial interventions including CBT, emotional exposure, and mindfulness training have demonstrated important benefits in alleviating pain symptoms [11].

Currently, there is increasing emphasis on non-pharmacological pain management approaches, often referred to as behavioral methods. These include relaxation techniques, touch therapy, music therapy, application of heat or cold, and acupuncture [12]. Such interventions promote patient autonomy, can be self-administered using simple tools, are generally well accepted, and do not produce the negative side effects associated with pharmacological treatments [13]. Mindfulness-based cognitive therapy (MBCT), developed by Segal, Williams, and Teasdale (2002), integrates elements of cognitive therapy designed to help individuals detach from their thoughts [14]. Mindfulness is defined as purposeful, non-judgmental attention to the present moment [15].

Numerous studies have explored the benefits of Acceptance and Commitment Therapy (ACT). For instance, Wulfolk et al. (2012) examined individualized cognitive-behavioral therapy incorporating relaxation training, activity regulation, emotional awareness, cognitive restructuring, and interpersonal skills training on pain symptoms in patients with fibromyalgia. Their results indicated that the intervention produced lasting benefits over a nine-month period [16]. Most studies suggest that mindfulness-based interventions yield positive health outcomes for participants [17].

Most previous research on ACT has been conducted in group settings, where group dynamics can influence participants' emotions, thoughts, and maladaptive behaviors. In contrast, the present study employed a single-case design focusing on two patients. Moreover, the ACT protocol was adapted specifically for cancer patients. This study aimed to investigate the effectiveness of Acceptance and Commitment Therapy in reducing pain levels in women with breast cancer.

2. RESEARCH METHOD

This study employed a single-case design. The statistical population consisted of all women diagnosed with breast cancer who visited Imam Hossein Hospital (Tehran, Iran) in 2018. The sample was selected using purposive sampling. Referring oncologists identified eligible patients based on predefined inclusion criteria, which were provided to them in writing, and referred these patients to the therapist. Two patients were included in this study.

Patient 1: A 42-year-old married woman with a high school education, diagnosed with bilateral breast cancer. In April 2013, she detected a lump in her breast by self-examination and subsequently visited a physician. Ultrasound confirmed the diagnosis of breast cancer, and she underwent surgery in May 2013. Twenty days post-surgery, she began her first chemotherapy session. In total, she received seven chemotherapy sessions at three-week intervals. Two weeks after completing chemotherapy, she underwent 30 sessions of radiotherapy, during which the Acceptance and Commitment Therapy (ACT) intervention was initiated. During psychotherapy, the patient did not use any psychotropic medications. She lacked social support and had a poor relationship with her spouse.

Patient 2: A 34-year-old married woman with a high school education, diagnosed with bilateral breast cancer. In September 2012, she visited a physician, and after ultrasound and laboratory tests, breast cancer was confirmed. She underwent surgery and began chemotherapy one month later. In addition to psychological distress, she experienced severe pain, especially in her right leg, which, after surgery, was diagnosed via electromyography (EMG) and MRI as nerve damage. Due to the accumulation of chemotherapy drugs, her leg has not yet fully recovered.

Inclusion criteria for this study were:

1. Clinical and cytological confirmation of stage I, II, or III breast cancer;
2. More than one month since diagnosis;
3. Minimum education level of middle school;
4. No concurrent diagnosis of another cancer;
5. Not receiving psychotropic medications during chemotherapy;
6. Age between 30 and 55 years;
7. No history of severe psychiatric disorders (psychotic) or psychiatric hospitalization;
8. No substance abuse;
9. Willingness to participate in the study.

Exclusion criteria included:

1. Absence from more than two intervention sessions;
2. Unwillingness to continue participation;
3. Use of psychotropic drugs for anxiety or depression during the study;
4. Disease recurrence or development of metastasis during the study.

Ethical considerations were observed, including the protection of participants' confidentiality, ensuring their comfort and well-being during the study, and allowing participants to withdraw from the study at any time.

2.1. Procedure

The study was conducted in the Oncology Department of Imam Hossein Hospital, Tehran. Research instruments were administered to the two patients at three time points: before the intervention (baseline), during the intervention (sessions 2, 4, 6, and 8), and two months after completing the intervention (follow-up). The intervention program consisted of eight sessions, each lasting 2.5 hours. The eight-session intervention protocol was based on Acceptance and Commitment Therapy (ACT) specifically adapted for cancer patients, as designed by Khakpour et al. (2014) [18].

2.2. Session Content

Session 1 – Self-Guidance: Establishing overall session policies, pre-test administration, providing explanations about breast cancer, its prevalence, causes, related treatments, and associated life disruptions. Participants were invited to discuss their personal expectations from the sessions. Activities included letter writing, walking exercises, mindfulness exercises, introduction to ACT, practicing eating raisins mindfully, discussion of feedback, and using the river metaphor (Rilke, 1996) to explore the journey with cancer. Participants were introduced to the concept of the automatic guidance system and the importance of present-moment awareness of bodily sensations, thoughts, and emotions for stress reduction. Exercises included body scan meditation and pause practice. Homework and session materials (handouts and CDs) were distributed.

Session 2 – Dealing with Obstacles: Body scan meditation, feedback discussion, mindful breathing to painful or affected areas (compassion toward the affected body parts), review of previous homework, street walking exercise, introduction of the ABC model for stress responses, mindfulness breathing meditation, pause exercises, homework assignment, and distribution of session materials.

Session 3 – Awareness of Breath and Body in Motion: Mountain meditation, compassion toward painful areas, seated mindfulness meditation, discussion of present-moment awareness, observing thoughts as mere thoughts rather than facts or events, awareness of pleasant events and daily activities, three-minute breathing space exercise, homework assignment, and distribution of session materials.

Session 4 – Learning Responsiveness: Seated meditation focusing on bodily sensations and thoughts, repeat body scan, three-minute breathing exercise, five-minute “seeing or hearing” practice, introduction of the F3 model

(Fight, Fuel, Add), training in compassionate response, mindful walking, homework assignment, and distribution of materials.

Session 5 – Permission to Be Present: Review of previous homework, breathing exercises, seated mindfulness meditation (awareness of breath, body, sounds, and thoughts), discussion of stress and participants' stress responses, awareness of pleasant and unpleasant events and their effects on feelings, thoughts, and bodily sensations, reading of Rumi's poem *Mehmansara*, three-minute breathing space, homework assignment, and distribution of session materials.

Session 6 – Thoughts Are Not Facts: Mountain meditation, review of the program so far, commitment to completing the intervention, review of previous homework, mindful yoga, seated meditation (awareness of sounds and thoughts), homework assignment, and distribution of session materials and CD #4.

Session 7 – Self-Care: Distribution of session handouts, preparing a list of unpleasant activities, weekly homework assignment, review of previous homework, sleep hygiene, and repetition of prior exercises.

Session 8 – Beyond Fear: Body scan exercise, program review, discussion and evaluation of exercises, and final feedback.

3. MATERIALS AND METHODS

3.1. Demographic Information Questionnaire

This questionnaire collected baseline demographic data including age, marital status, education level, socio-economic status, educational background, work history, affected breast, alcohol and tobacco use, duration since diagnosis, and stage of cancer.

3.2. McGill Pain Questionnaire (MPQ)

The McGill Pain Questionnaire is one of the most validated tools for assessing pain, particularly chronic and resistant pain. Among the most important qualities of any research instrument are accuracy, reliability, and validity, all of which are well-established in the MPQ [19]. This questionnaire allows patients to express their pain perception across three fundamental dimensions: sensory, affective, and evaluative. Another key advantage of the MPQ is its ability to detect differential pain.

The MPQ was developed by Melzack (1973) and tested on 297 patients suffering from various types of pain [20]. The core section of the questionnaire (Section 2) consists of 20 sets and sub-sets of words describing the mental perception of pain, including the affective dimension, sensory dimension, evaluative dimension, and miscellaneous pain dimensions, as well as the total pain score. In Iran, the questionnaire has shown a Cronbach's alpha of 0.85 and a reliability coefficient of 0.80 across all domains (sensory, affective, and neuropathic) [21].

3.3. Ethical Considerations and Intervention

The intervention was conducted by a clinical psychologist at the master's level, familiar with the ACT protocol. Written informed consent was obtained from both patients in accordance with research ethics. Ethical principles, including confidentiality, protection of participants' well-being and comfort, and the right to withdraw from the study at any time, were fully observed.

4. DATA ANALYSIS

Data were analyzed using single-case experimental designs. In this approach, visual analysis of graphs is employed to examine variations in the dependent variable across experimental conditions, provided the data are stable within each condition. First, data collected at the three time points baseline, intervention, and follow-up for each patient were plotted on individual graphs. Subsequently, within-case analysis was conducted to interpret the graphs and evaluate changes across similar conditions for each patient.

Table 1. Raw Scores of Pain Components at Baseline, Intervention, and Follow-up for Two Patients

Patient	Baseline Session 1	Baseline Session 2	Baseline Session 3	Baseline Session 4	Intervention Session 2	Intervention Session 4	Intervention Session 6	Intervention Session 8	Follow-up 1	Follow-up 2
Patient 1	32	34	26	31	27	25	26	20	22	21
Patient 2	26	22	22	30	20	18	21	21	20	20

Based on the data presented in Table 1, the pain scores of both patients significantly decreased during the intervention phase compared to baseline. Moreover, this reduction trend persisted during the follow-up period. Therefore, Acceptance and Commitment Therapy (ACT) based on mindfulness was effective in reducing pain symptoms in both patients, leading to a notable decrease in pain intensity.

Table 2. Median Scores of Pain Components at Baseline and Intervention Phases

Patient	Phase	Median Pain Score
Patient 1	Baseline (A)	31.5
Patient 1	Intervention (B)	25.5
Patient 2	Baseline (A)	30.75
Patient 2	Intervention (B)	24.5

Interpretation:

As shown in Table 2, the median pain scores of both patients decreased from the baseline phase (A) to the intervention phase (B). This reduction indicates that Acceptance and Commitment Therapy (ACT) based on mindfulness was effective in alleviating pain levels in the studied patients.

Based on the data presented in Table 2, both the median and mean pain scores in Phase B (intervention) were lower than in Phase A (baseline) for both patients. This finding demonstrates that Acceptance and Commitment Therapy (ACT) contributed to a reduction in pain intensity among the patients.

Furthermore, the stability envelope (or stability range) was calculated using the following formula (20% of the median score in each phase):

Patient 1

- Baseline (A): $31.5 \times 20\% = 6.3$
- Intervention (B): $25.5 \times 20\% = 5.31$

Patient 2

- Baseline (A): $24 \times 20\% = 4.8$
- Intervention (B): $20.5 \times 20\% = 4.1$

These calculations indicate that the stability range decreased during the intervention phase, further supporting the effectiveness of ACT in reducing pain symptoms.

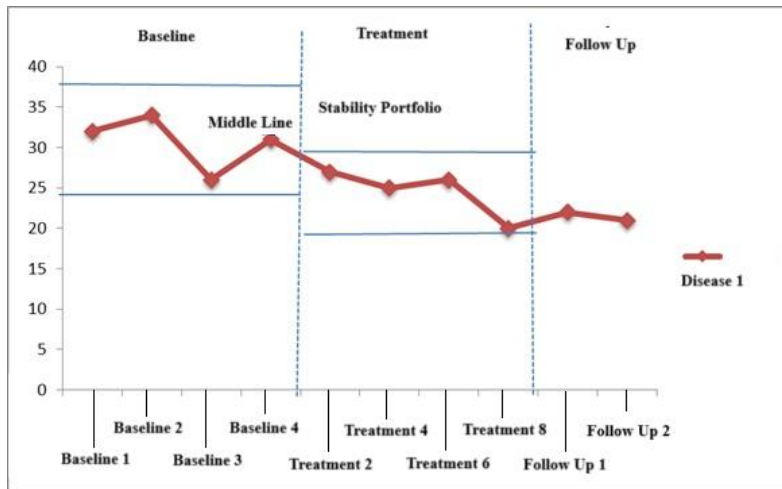


Fig. 1. Median Line and Stability Envelope for Pain in Patient 1

As shown in Figure 1, the data level in both Phase A (baseline) and Phase B (intervention) can be described in terms of stability. In Phase A, 75% of the data points (3 out of 4) fell within the stability envelope, indicating a stable trend. However, in Phase B, none of the data points (0 out of 4) were located within the stability envelope, which suggests that the intervention phase did not demonstrate statistical stability.

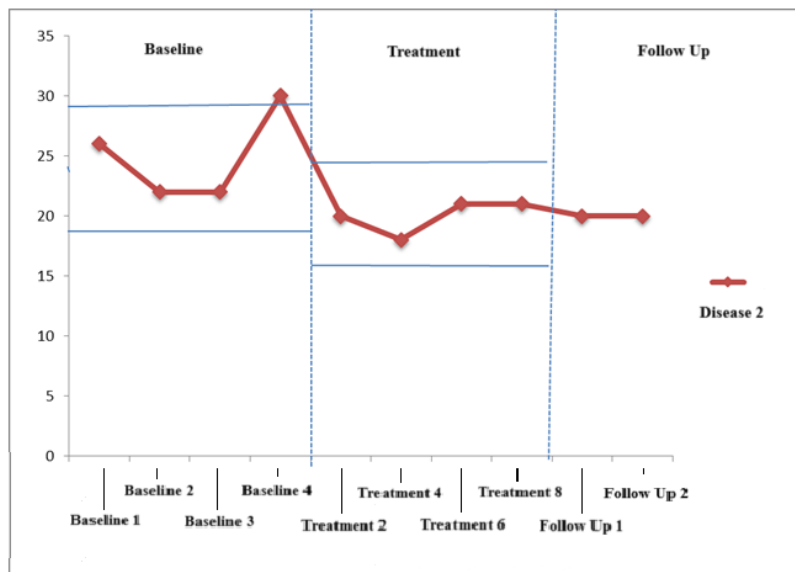


Fig. 2. Median Line and Stability Envelope for Pain in Patient 2

As shown in Figure 2, the data levels in both Phase A (baseline) and Phase B (intervention) can be described as stable, since 75% of the data points (3 out of 4) fell within the stability envelope.

5. DISCUSSION AND CONCLUSION

The aim of this study was to investigate the effectiveness of Acceptance and Commitment Therapy (ACT) on the pain levels of patients with breast cancer. In summary, the findings indicated that ACT led to a significant reduction in pain intensity among breast cancer patients following the intervention. Previous studies have demonstrated that mindfulness-based therapies are effective in addressing physical conditions, and when combined with cognitive–

behavioral techniques and tailored for cancer patients, they can strengthen coping skills and enable long-term management of symptoms and pain [22, 23].

In fact, the integration of emotional expression with mindfulness represents a therapeutic approach that enhances treatment outcomes by reducing stress and tension through cognitive-behavioral methods [24]. Mindfulness, as a clinical tool, is particularly valuable for patients who are unable or unwilling to access and experience their emotions [25]. Carmody and Baer (2008) reported a significant association between mindfulness practice, mindfulness levels, medical and psychological symptoms, and overall well-being in a mindfulness-based stress reduction program [26]. Similarly, Baer (2003) showed that mindfulness training, as a clinical intervention, produced a desirable effect size (0.55) in reducing pain symptoms among patients [27].

Several factors may explain why ACT was specifically beneficial in reducing pain intensity in this study. Through ACT, patients learn effective strategies for managing neurotic symptoms. Extensive use of relaxation training and emotional expression across sessions provided multiple therapeutic benefits. The sustained effects of ACT on reducing pain may be attributed to the intensive structure of the intervention sessions. The consistent emphasis on relaxation training as a stress management skill, intended to become a stable component of patients' coping repertoire, likely equipped participants with tools for alleviating cancer-related distress over the long term.

Moreover, patients in this study received eight individual intervention sessions with the same therapist, which may have fostered a stronger therapeutic alliance. This relationship itself could have facilitated treatment adherence and contributed to better outcomes.

However, given the quasi-experimental design, this study has specific limitations. The most important include the inability to fully control confounding variables, reliance on self-report measures, and the lack of assessment of contextual factors that may have influenced treatment effectiveness. Future studies are recommended to incorporate longer follow-up periods to better evaluate the durability of treatment outcomes.

In conclusion, this study demonstrated that Acceptance and Commitment Therapy significantly reduced pain intensity among breast cancer patients recruited from the oncology department of Imam Hossein Hospital in Tehran. The findings highlight the potential therapeutic value of ACT for improving pain management in oncology settings, though further research is needed to replicate and extend these results.

Transparency Statement

The data supporting this study are available upon reasonable request to the corresponding author, subject to ethical and confidentiality considerations.

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Declaration of Interest

The authors declare that they have no competing interests.

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