

# Effects of Acceptance and Commitment Therapy versus Mindfulness Based-Stress Reduction in Patients with Ulcerative Colitis: A Clinical Trial

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## ABSTRACT

### Background:

Ulcerative colitis is a gastrointestinal disease with a chronic inflammatory condition. Therefore, psychological therapies to better adapt to this disease are considered vital and cause a significant improvement in psychological and physiological symptoms of patients with ulcerative colitis. This study aimed to compare the effectiveness of acceptance and commitment therapy (ACT) and mindfulness-based stress reduction (MBSR) on physiological symptoms, pain perception, and the general health of patients with colitis in three independent groups: (i) ACT, (ii) MBSR, and (iii) the control. The efficacy of ACT and MBSR were also compared immediately after treatment and 2 months later.

### Materials and Methods:

This quasi-experimental study was performed on 45 patients with colitis after examining the inclusion and exclusion criteria and drops of the subjects. They were equally divided into three groups: ACT, MBSR, and control. They completed the McGill Pain Perception, General Health Questionnaire (GHQ-28), and the Partial Mayo Scoring Index Assessment. For statistical analysis, SPSS software version 24 with a significance of  $P < 0.05$  was used.

### Results:

The results indicate that both treatments effectively affect physiological symptoms, pain perception, and colitis's general health. In reducing physiological symptoms and pain perception, no significant difference between the two treatments was reported in the post-test. However, ACT was more effective and had a longer-lasting effect on general health.

### Conclusion:

ACT and MBSR effectively reduce the symptoms of colitis, but ACT is more effective in general health.

**Keywords:** Acceptance and commitment therapy; Mindfulness based-stress reduction; Ulcerative colitis; Pain perception; Physiological symptoms

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## INTRODUCTION

Inflammatory bowel disease (IBD) includes ulcerative colitis and Crohn's disease, characterized by recurrent inflammation and pain in the intestinal tract and impairs routine functioning(1). In 2015, 3.1 million people in the United States were diagnosed with IBD, accounting for 1.3% of the total US population(2). Although IBD has been concentrated in industrial regions of the world in recent years, new research suggests that over the past two decades, it has also increased significantly in Asian nations(3). Extensive

research conducted by Malekzadeh and colleagues in 2016 to measure the prevalence of IBD in Iran showed that for every 100,000 population in this country, 35.52 people had colitis, and 0.53 people had Crohn's disease. Both are increasing, with improved living conditions, urban living, and the resulting stresses contributing to that(4). Therefore, there is an alarm for the research community to comprehend IBD and people's characteristics through more research to help them adapt.

Ulcerative colitis is a chronic inflammatory disease that can affect any part of the large intestine. The symptoms appear in the anus, such as diarrhea with bleeding and abdominal pain(5) and usually begin in early adolescence. The natural history of this recurrent inflammation shows that although most patients complain of high pain intensity in the early stages of diagnosis, almost all experience varying degrees of pain ranging from mild to moderate to severe(6).

One of the essential psychological disorders in patients with IBD that reduces their general health is depression, affecting 25%(7). Depression is associated with the activation of the immune system and cytokine secretion, which increases the risk of IBD and causes the recurrence of symptoms(8). One of the psychological problems that accompany this disease and affect general health is increased anxiety levels. Previous studies indicate that 21% of sufferers report anxiety(7). In addition to the psychological problems inevitably associated with this disease, pain and its perception can also affect patients' quality of life. Because pain is a common symptom of this disease and does not include just the usual abdominal pain, it can also cause pain outside the gut(9). Psychological manifestations, along with the disease's physiological symptoms, lower the patients' level of adoption and impair their quality of life. Therefore, each person's general health and perception of the body's health can affect their life quality(10).

The purpose of the ACT is to create cognitive flexibility to increase one's capacity to be in the moment and to be acutely aware of one's thoughts and feelings (even if they are unacceptable), and to make one live by one's values(11). This treatment considers the root of psychological disorders to arise from individuals' inflexible responses (thoughts, behaviors,

and emotions) to their inner experiences.

Mindfulness-based therapies reduce psychological symptoms such as stress, anxiety, and depression and increase adherence to health-related behaviors such as exercise and proper diet, directly on biological pathways such as the autonomic nervous system and the affected immune system. Although mindfulness interventions have proven effects on reducing stress and psychological anxiety, to date, they have been used in few studies for patients with colitis(12).

This study aimed to evaluate and compare the effectiveness of ACT and MBSR on psychological symptoms of patients with colitis in items such as general health and pain perception. Physiological symptoms such as diarrhea, bleeding, and abdominal pain, which are standard colitis features, were also measured in this study. The effectiveness of these two approaches at two different times (i) immediately after the intervention and (ii) 2 months later was compared. As far as we know, this is the first study in Iran, and internationally that compares the effectiveness of ACT and MBSR on psychological variables such as general health and pain perception in ulcerative colitis. In a few psychological studies performed on the population with IBD, we examined these physiological and psychological indicators.

## MATERIALS AND METHODS

A clinical trial was conducted from September 2019 to August 2020 with purposive sampling in men and women with colitis registered in the gastrointestinal and liver center of Kerman province, in Iran. This intervention was performed as a single-blind study, which means that patients did not know the number of intervention groups and the study's general design. Criteria for entering the research included the following: 1. In terms of fluctuation, the disease symptoms have reached a stable level, 2. the patient should have an age range between 18 and 65 years, and 3. The women included in the study should not be pregnant. Exclusion criteria were: 1. Use of psychiatric services, 2. Use of antidepressants, 3. History of steroid use in the past three months, and 4. Use of stress management program including relaxation techniques, psychotherapy, psychoanalysis, cognitive-behavioral therapy, and hypnosis.

Of the 160 patients with chronic colitis who had

a medical record at the Gastroenterology and Liver Center, 90 participated in the study voluntarily. They completed the Pain Perception, General Health, and Partial Mayo Scoring Index Assessment questionnaires in the researcher's presence at the hospital. The last questionnaire, related to the patients' physical symptoms, is completed jointly by the patient and the physician. After reviewing the entry and exit criteria for entering the study, 90 people were randomly assigned to each ACT, MBSR, and control group. The results of five patients were excluded from the study because they met the exclusion criteria. Patients filled in the relevant questionnaires in three stages of pre-test, post-test, and follow-up. Finally, considering the drop in the subjects in the two phases of the intervention and follow-up, 45 patients completed both these stages.

#### MEASURES

Participants completed three questionnaires for assessment and a demographic questionnaire that included age, sex, education level, marital status, and medications.

**McGill Pain Perception Questionnaire (Malzak, 1975):** This questionnaire examines the nature and severity of pain from different aspects based on objective and experimental methods in the form of statistical and quantitative data and explores the quantitative and qualitative aspects of pain. To do this, it contains 20 subsets of words to describe the pain. This questionnaire contains the following dimensions: 1. Sensory perception of pain, 2. The dimension of emotional perception of pain, 3. Perception of pain assessment, and 4. Dimensions of various pains. The sum of the scores obtained from the patient's terms is called the Pain Rating Index (PRI) in different groups. This questionnaire's validity and reliability have been proven in several studies(13). Dworkin and colleagues estimated the Cronbach's alpha coefficient to be 0.95(14).

**General Health Questionnaire (GHQ-28) Goldberg and Hiller, 1979:** This questionnaire consists of four scales (depression, anxiety, social function, and physical function), and each scale has seven questions. The questions in this questionnaire

examine a person's mental state in the last month. It includes signs such as abnormal thoughts and feelings and observable behavior that emphasize the current situation. Goldberg & Williams (1998) had a reliability of 0.95. Reported method for the whole questionnaire (15). To evaluate the validity of the General Health Questionnaire, Williams, Goldberg, and Mari in 1987, conducted meta-analytical studies and estimated the average sensitivity of the GHQ-28 questionnaire as 0.84 and its moderate specificity as 0.82(16).

#### Partial Mayo Scoring Index Assessment

**(Sutherland et al., 2003):** Anal bleeding and the frequency of bowel movements are two indicators that are measured in this index. This index can be a strong differentiator for recovery periods and disease activity and acceptable validity(17). The patient is first asked to record the number of bowel movements before developing colitis. Then answer two questions relevant to the past 3 days about the number of daily stools and rectal bleeding. The third question is scored by the relevant doctor from 0 to 3 according to the patient's previous two questions. A patient's overall score on the Mayo Colitis Index is the sum of these three questions. In a 2008 study by Lewis and colleagues, the sensitivity of the partial index of colitis activity was 88%. Also, the result of Turner and others (2009) research showed that this index's diagnostic validity was 95%(18).

#### ETHICS

After obtaining a license from the Center of Gastroenterology and Liver of Kerman province, with the identification code IR. KMU.REC.1398.252 in the ethics committee of Kerman medical sciences, the possibility of research was provided for the researchers. The clinical trial code IRCT20190708044156N1 in Iran Registry of Clinical Trial Center has been dedicated to this research. Participants were informed about the sessions' process and were assured that their names would not be published and that the purpose of doing so was to conduct scientific research. All participants completed a form for voluntary participation in the study.

**Table 1:** Mean and standard deviation of research variables

Variables	Stages	Control group		MBSR group		ACT group	
		SD	Mean	SD	Mean	SD	Mean
Physiological index of colitis	Pre-test	1.76	4.67	1.41	4.00	1.85	5.13
	Post-test	1.93	5.27	0.91	1.47	1.25	2.13
	Follow up	2.12	5.93	1.18	2.40	1.83	3.27
General health	Pre-test	12.76	56.67	12.49	51.13	10.60	50.87
	Post-test	11.07	61.80	7.42	30.67	7.00	18.27
	Follow up	8.28	67.08	8.54	40.13	8.42	28.3
Pain perception	Pre-test	9.36	44.07	7.80	43.60	6.78	44.80
	Post-test	8.25	47.93	7.26	37.47	8.86	33.00
	Follow up	7.59	51.67	5.92	43.80	8.65	40.40

**Table 2:** Results of Wilkes Lambda multivariate test to evaluate the differences between centroids of research variables

	Source of changes	Statistical power	Eta	Significance	Degree of error freedom	Degree of Hypothesis Freedom	F	Lambda Wilkes
Therapy	Between-group	1.000	0.445	0.000	82	6	10.967	0.890
Time	Within-group	1.000	0.931	0.000	37	6	82.770	0.069
Time×therapy		1.000	0.416	0.000	74	12	9.413	0.157

### Data analysis

Qualitative variables are described as both absolute (N) and relative iteration (%). The underlying assumptions of covariance analysis (Leven variance homogeneity and regression slope homogeneity) were investigated. Multivariate analysis of covariance (MANCOVA), univariate analysis (ANCOVA), and Bonferroni post hoc test were used to test the statistically significant differences between the means of the experimental and control groups. Thus, the pre-test was considered a control variable, and analysis was performed on dependent variables in the post-test stage. In this study, MANCOVA was used to analyze the variables, compare the groups' means, and eliminate the intervening variables' effect.

### RESULTS

Demographically, in each ACT, MBSR, and control group, 15 people of both sexes were included separately, including male and female. The mean age of individuals in the ACT group was 34.60 (S.D=8.00), in the MBSR group was 32.07 (S.D=4.65), and in the control group was 31.73 (S.D = 6.79) years.

For evaluating the significance of changes, a mixed analysis of variance test was used. The results of the Shapiro-Wilks test showed that the variables were normal in most groups and times ( $P<0.05$ ). The results of the Leven test also showed that in most cases, the error variance of the groups was homogeneous in different variables ( $P<0.05$ ). Finally,

**Table 3: Results of univariate tests to examine the means of research variables**

Source of changes	Variable	Statistical power	Eta	Significance	F	Mean Square	DF	Sum of squares	
Therapy	Between-group	Physiological index of colitis	0.997	0.399	0.000	13.916	82.963	2	165.926
Time	Within-group		1.000	0.437	0.000	32.667	30.541	2	61.081
Time×therapy	Within-group		1.000	0.468	0.000	18.465	17.263	4	69.052
Therapy	Between-group	General health	1.000	0.692	0.000	47.210	10587.207	2	21174.415
Time	Within-group		1.000	0.676	0.000	87.432	2877.607	2	5755.215
Time×therapy	Within-group		1.000	0.709	0.000	51.116	1682.363	4	6729.452
Therapy	Between-group	Pain perception	0.873	0.230	0.004	6.268	872.030	2	1744.059
Time	Within-group		1.000	0.298	0.000	17.867	428.763	2	857.526
Time×therapy	Within-group		1.000	0.338	0.000	10.745	257.841	4	1031.363

**Table 4: Results of LSD post hoc tests to examine the differences between the means of the groups at different times**

Variables	Stages	Differences between ACT and MBSR	Differences between MBSR and control	Differences between ACT and control
Physiological index of colitis	Pre-test	1.133	-0.657	0.467
	Post-test	0.667	-3.000**	-3.133**
	Follow up	0.867	-3.533**	-2.667**
General health	Pre-test	-0.267	-5.533	-5.800
	Post-test	-12.040**	-31.133**	-43.533**
	Follow up	-11.800**	-27.933**	-39.733**
Pain perception	Pre-test	1200	-0.467	0.733
	Post-test	-4.467	-10.467**	-14.933**
	Follow up	-3.400	-7.867**	-11.267**

\*\* Significant at the level of 0.01

the Box and Machley test results also showed that the homogeneity assumption of covariance and sphericity matrix was satisfied ( $P<0.05$ ).

Since there were three dependent variables in this study, to prevent the inflation of the first type of error, Wilks lambda multivariate statistic was first reported. This statistic is presented in table 2.

Based on the multivariate test results presented in

table 2, the treatment factor, time, and the interaction of time and treatment were significant ( $P<0.05$ ). Therefore, groups and times were significantly different in at least one of the variables. Due to the significance of multivariate statistics, the results of univariate tests were examined. The results of these tests are presented in table 3.

As table 3 shows, the time factor, treatment, and

time and treatment interaction were significant in all variables ( $P < 0.01$ ). Therefore, there was a significant difference between ACT, MBSR, and control treatment groups and also pre-test, post-test, and follow-up stages. LSD post hoc tests were performed to determine precisely which groups differed and at what time stage. The results of these tests are reported in table 4.

Both treatments were effective. Although, at this stage, there was no significant difference between the mean scores of the ACT and MBSR groups in the variables of physiological symptoms and pain perception ( $P < 0.05$ ), in the case of general health problems, the participants of the ACT group had a more significant decrease than the MBSR group ( $P < 0.01$ ). Therefore, ACT was more effective than MBSR in general health problems. ACT maintained its superior effectiveness over MBSR in the variable of general health problems in the follow-up phase.

## DISCUSSION

This study shows that ACT and MBSR equally decrease the unpleasing physiological symptoms of colitis. A normal inflammatory reaction occurs because it increases the body's resistance to viruses and other factors outside the body. However, the body's immune system is broken down and detrimentally affects organs and systems in the long run. If inflammation spreads in the body, the disease behaviors include discomfort, unhappiness, fatigue, decreased libido and food absorption, social isolation, and high blood pressure to maintain energy within the body(19). Furthermore, there is evidence of a link between the brain and the visceral system in clinical studies involving some disorders, including anxiety disorders. Anxiety is related to the immune system and the endocrine system. Facing stress triggers an anxious reaction in the body. Along with anxiety, visceral dysfunction occurs, and the body's immune system lowers(20), increasing inflammation in the body and causing the recurrence of IBD. In colitis, there is a feeling of tiredness(21), anxiety, stress, depression(22), and other psychological factors complicate treatment and decrease the immune system's function. Therefore, ACT and MBSR as psychological therapies can be used to reverse the effect of inflammation on the body.

Our findings suggest that both ACT and MBSR have been beneficial to pain perception, and these outcomes are present in the follow-up. Exaggerated psychological responses to the experience of feeling pain create a negative cycle that increases the experience of pain, prolongs it, and builds resistance to recovery. Physiologically, it is up to the brain's amygdala to judge whether a particular stimulus is considered a threat. The amygdala secretes the cortisol (stress hormone) after perceiving the event as threatening, activating the fight or flight response. Memories, of which fear is the main element, are also activated, and disproportionate emotional responses follow this cycle. As the HPA (hypothalamic-pituitary-adrenal) axis becomes active, the inflammation in the body increases, leading to a recurrence of IBD. In research, dealing with pain is the element that will break this cycle(23). Coping with pain can return to baseline and, ultimately, recover the pain. Focusing on breathing and reducing a person's alertness to a threatening event (pain) can be one of the factors that reduce pain(24). This factor in both therapies makes them act similarly in pain perception.

This study indicates that ACT is more influential than MBSR in general health, and these results retain their effect in the prolonged run. The general health index includes four dependent variables: physical symptoms, anxiety symptoms, social dysfunction, and depressive symptoms, which will be explained below.

The hypothalamic-pituitary-adrenal axis is activated with psychosocial stress. Activation of this axis increases cortisol, which helps people cope with stress in the short term. However, if this stress is not relieved in the long term, the HPA axis becomes overactive, and this condition leads the person to depression. Takes in connection with the effect of long-term cortisol secretion, in addition to the feeling of depression that follows, we can mention the increase of cytokines such as CRP, which will cause inflammation in the body(25,26).

One of the neuropsychological functions impaired in depression is attention and concentration(27). The problem is that people see everything as regular and limited events that can be new and attractive. Therefore, the mind can teach this view by reminding us that even the most minor issues and events (such



as eating raisins) have their novelty and charm, which we can realize only by paying attention and not judging to lighten everything normal and permanent in people's eyes and to be effective on their depression index.

In mindfulness, only the sensory experience is emphasized, and the brain's structure does not change(24), while in the Acceptance and Commitment Therapy, cognitive and emotional processes, in addition to sensory experiences, are likely to cause longer-term changes. In the ACT, this encounter occurs through creative frustration and acceptance, so people are trained to accept and observe their bodily sensations, even if they are unpleasant(23). The concept of self as a context also reminds us that as an internal observer, one should focus solely on one's existence, refrain from judging oneself and saying negatively charged sentences, and only on oneself as an independent being. Being in the moment helps people get rid of anxious thoughts and experience peace. Anxiety also harms judgment, solving new problems, and short-term memory, making it difficult to find solutions(28), emphasized in the ACT. So, ACT is more effective, and its effect lasts longer.

## CONCLUSION

In this study, we compared the effectiveness of two psychological therapies, ACT and MBSR, on patients' general health, pain perception, and physiological symptoms of colitis, including anal bleeding, abdominal pain, and diarrhea. The effectiveness of these two approaches at two different times (i) immediately after the intervention and (ii) two months later compared. Results showed that ACT and MBSR reduced the physiological parameters of colitis and defeated psychological ones. These two psychological therapies have the same consequence on the perception of pain and the physiological symptoms of colitis, while the ACT is more effective and has a long-lasting effect than MBSR on general health. One of the limitations of this study is the lack of cortisol and CRP levels assessment. Also, patients with Crohn's disease could not participate in the study because they are a smaller number of patients with IBD. The results of follow-up data are two months after the implementation of the intervention, which should be careful in generalizing the results. In future studies, special attention is suggested to be paid to disorders highly associated with colitis, such as eating

disorders and sexual dysfunction. Also, compare the effectiveness of different psychological therapies on patients in the active and inactive phases of the disease. Subsequent studies may address cognitive symptoms in patients with colitis, such as alexithymia and emotional maladaptation.

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