

Comparing the effectiveness of online individualized transdiagnostic treatment with acceptance and commitment therapy on medication adherence, gastrointestinal symptoms and perceived stress of patients with irritable bowel syndrome

Homa Shahkaram¹, Amir Sadeghi², Abbas Masjedi Arani¹, Maryam Bakhtiari¹, Amir Sam Kianimoghadam¹

¹Department of Clinical Psychology, School of Medicine, Shahid Beheshti University of Medical Sciences, Tehran, Iran

²Gastroenterology and Liver Diseases Research Center, Research Institute for Gastroenterology and Liver Diseases, Shahid Beheshti University of Medical Sciences, Tehran, Iran

ABSTRACT

Aim: This study aimed to investigate whether transdiagnostic treatment as well as acceptance and commitment therapy (ACT) could improve treatment adherence and alleviate gastrointestinal symptoms plus perceived stress in patients suffering from irritable bowel syndrome.

Background: Research has shown that people with chronic diseases often have negative attitudes toward medications, especially when they also have psychiatric disorders. This, along with the complex dosing requirements and inadequate knowledge about medication adherence among irritable bowel syndrome patients, can affect the treatment efficacy.

Methods: A randomized clinical trial was conducted using a pre-test-post-test design. The statistical population included patients with irritable bowel syndrome referring to Taleghani Hospital in Tehran between winter 2021 and spring 2022. Convenience sampling was used to select 30 individuals, with 15 people assigned to each group. Two types of psychotherapy were provided online and individually to the participants. The desired treatments were given to the transdiagnostic treatment and ACT groups in eight weekly sessions of 45-60 minutes.

Results: There was no significant difference between the transdiagnostic treatment pre-test and ACT regarding perceived stress, medication adherence, and gastrointestinal symptoms ($P>0.05$). There was no significant difference either between the transdiagnostic treatment and ACT post-test. However, there was a significant difference between the pre-test and post-test phases of ACT regarding adherence, gastrointestinal symptoms, plus perceived stress ($P<0.05$) and transdiagnostic treatment regarding gastrointestinal symptoms ($P<0.05$).

Conclusion: Specialists may use transdiagnostic treatment and ACT as effective psychological treatments to alleviate gastrointestinal symptoms and perceived stress, thereby increasing treatment adherence in patients with irritable bowel syndrome.

Keywords: Acceptance and commitment therapy, Medication adherence, Irritable bowel syndrome, Stress, Physiological

(Please cite as: Shahkaram H, Sadeghi A, Masjedi Arani A, Bakhtiari M, Kianimoghadam AS. Comparing the effectiveness of online individualized transdiagnostic treatment with acceptance and commitment therapy on medication adherence, gastrointestinal symptoms and perceived stress of patients with irritable bowel syndrome. *Gastroenterol Hepatol Bed Bench* 2024;17(3):288-296. <https://doi.org/10.22037/ghfbb.v17i3.2920>).

Introduction

Irritable Bowel Syndrome (IBS) is a digestive condition that can cause abdominal pain, bloating, and changes in bowel habits. In Iran, the prevalence of IBS

varies between 1.1% and 25% for different populations. This condition affects about 5-10% of healthy individuals at any given time and is characterized by recurring and subsiding periods (1-3).

IBS is a condition caused by a combination of different factors, including gut dysbiosis, bowel motility dysfunction, altered visceral sensitivity, immune activation, and genomic associations. Early life stressors can also contribute to IBS. Recent studies have shown

Received: 10 February 2024 Accepted: 11 April 2024

Reprint or Correspondence: Amir Sam Kianimoghadam, Department of Clinical Psychology, School of Medicine, Shahid Beheshti University of Medical Sciences, Tehran, Iran.

E-mail: kianimoghadam@sbmu.ac.ir

ORCID ID: 0000-0001-8686-523X

that patients with Irritable Bowel Disease (IBD) and mental disorders have higher costs of treatment compared to those without mental disorders. Mental disorders in patients with IBD can increase the risk of relapse and lead to poor treatment compliance (4-6).

Patients with IBS are more likely to experience higher levels of stress, as research shows a clear association between the condition and perceived stress. Additionally, cortisol levels were found to be linked to perceived stress, highlighting the significant impact that stress can have on the body (7). Alterations in the hypothalamic-pituitary-adrenal (HPA) axis, a component of the central stress response, have been implicated in IBS. However, the evidence in this regard is inconclusive (7). Based on self-reported data, it has been found that around 70% of individuals with IBD believe that stress plays a significant role in the course of their illness. Additionally, 85% of patients state that effectively coping with stress has a positive impact on their disease progression. Multiple studies have collectively suggested that an increased perception of stress elevates the risk of symptom relapse (8-10).

Previous studies have indicated that individuals with IBS may have negative views about medications, especially when they also have concurrent psychiatric conditions (11). This, coupled with the intricate dosing procedures and insufficient knowledge about medication adherence among IBS patients, can negatively impact the effectiveness of treatment. Patients should take their medication as prescribed, as adherence plays a significant role in the success of any pharmacological treatment. Studies have established a strong link between medication adherence, healthcare resource utilization, and cost, especially in the case of chronic diseases (12). Indeed, improving adherence to pharmacological treatments can significantly help manage chronic diseases. Poor adherence is a major cause of inadequate health outcomes and increased costs associated with chronic diseases that require long-term medication therapy (13, 14).

Several types of psychotherapy can improve symptoms of IBS and enhance individual performance (1). The treatment of IBS usually involves educating patients about the condition, making dietary changes, increasing soluble fiber intake, and taking antispasmodic medications. Establishing a strong patient-physician relationship is essential in managing

IBS, requiring active listening, empathy, and realistic treatment expectations (15). Recently, a transdiagnostic treatment called Unified Protocol (UP) has gained attention in different populations (16). It emphasizes the shared components that cause and perpetuate mental disorders. UP derives from cognitive-behavioral therapy and focuses on emotions. It targets unpleasant emotions and trains patients in adaptive emotion regulation strategies (17, 18). UP emphasizes the importance of adaptively applying emotions and increasing awareness of their role in cognition, bodily sensations, and behavior. ACT, which is based on cognitive behavioral therapy, is a proven treatment method for reducing IBS symptoms (19). The main goal of this therapy is to promote psychological flexibility by addressing experiential avoidance, which involves avoiding personal thoughts, emotions, sensations, and events (20-22). Research has shown that CBT and hypnotherapy-based interventions are highly effective in treating IBS, while ACT has a significant impact on the depression levels and life satisfaction of IBS patients. Further, transdiagnostic treatment has been found to have a positive effect on the emotional regulation of patients with IBS (22).

Psychological factors play a crucial role in the course, control, prognosis, and clinical outcomes of IBS, which has become increasingly prevalent in recent decades. As such, it is vital to prioritize the mental health of these patients. UP focuses on comorbid symptoms of emotional disorders and targets them, resulting in simultaneous improvement of comorbid symptoms of diseases. It is essential to consider the effects of these therapies not only on psychological symptoms but also on gastrointestinal symptoms and medication adherence. Patients with IBS often experience low adherence to their treatment plans, which can be attributed to a range of psychological factors. As a result, it is crucial to address these psychological issues as part of an effective treatment plan. Two psychotherapy methods -UP and ACT - have been investigated for their potential to improve adherence in patients with IBS. Both UP and ACT have shown promise in addressing the psychological factors in patients with IBS. By improving psychological well-being and reducing stress, these psychotherapy methods may help improve adherence and overall health outcomes in patients with IBS. Accordingly, this study

290 Comparing the effectiveness of transdiagnostic treatment with ACT on IBS patients

aims to examine whether UP and ACT can enhance treatment adherence and alleviate gastrointestinal symptoms and perceived stress in patients with irritable bowel syndrome.

Methods

Trial design

The study followed a clinical trial approach with a pre-test and post-test design. The statistical population involved patients with IBS referring to Taleghani Hospital in Tehran between 2021 and 2022.

Participants

This study involved 40 patients diagnosed with IBS referring to Taleghani Hospital in Tehran. The criteria for participation included a) diagnosis of IBS by a specialist doctor, b) age above 18 years old, c) having a minimum education in reading and writing, and d) providing written informed consent to participate in the study. The exclusion criteria were a) if a patient was unwilling to continue treatment, b) if there was incomplete or biased completion of questionnaires, or c) if they missed more than two consecutive treatment sessions.

Sample size

The study used Gpower software to calculate sample size with effect size = 0.40, alpha = 0.05, and statistical power = 0.80. The necessary sample size was found 40 (20 individuals per group). Participants were given distinct numbers and then randomly divided into two groups using a random number generator based on these numbers.

Study procedures

First, the participants were selected using the available sampling method and then assigned randomly to the research groups. In the study, data from 15 individuals in the UP group (12 female) and 15 in the ACT group (13 female) were analyzed. Single blinding was implemented, with participants being unaware of the treatment type.

Intervention

The patients were informed about the goals of the study by the researcher. If they agreed to participate in the research, they were given a written informed consent form and pre-test questionnaires to complete. In this study, following the sampling process in the pre-test stage, the desired treatments were presented to the participants online and individually based on similar conditions and specific protocols. The UP and ACT groups received the

desired treatments in eight sessions of 45-60 minutes weekly. Furthermore, the participants answered the questionnaires during the post-test phase. The UP protocol was taken from Barlow et al. (2011) (2011) (22-24), while the ACT protocol was taken from the educational therapy package of Hayes et al. (1999) (21-25).

UP protocol: i) improving patients' motivation and commitment to treatment using motivational interviewing and psychological coaching to encourage involvement, boosting self-esteem and confidence in personal abilities, explaining the treatment rationale and establishing treatment goals, and providing workbooks and worksheets to track session tasks; ii) teaching how to identify and regulate emotional responses, understand emotions, and learn behaviors. The three-component model of emotional experiences is introduced, along with the AR model (antecedents, responses, and consequences) and emotional awareness training; iii) by utilizing mindfulness techniques that involve non-judgmental and present-focused awareness of emotional experiences, one can learn to observe their emotional experiences, including emotions and reactions; iv) reassessing and reinterpreting, acknowledging the interconnectedness of thoughts and feelings, recognizing internal inconsistencies, changing perspective, and improving cognitive adaptability; v and vi) recognizing patterns of avoiding emotions and exploring behaviors triggered by emotions that lead to the reappearance of disease symptoms; vii) experiencing intense confrontation and facing emotions triggered by circumstances, gaining insight into the rationale behind emotional dreams, instructing on how to prioritize fears and avoidances, creating exercises for emotional confrontation that are both frequent and impactful clearly and measurably, and discouraging avoidance; viii) preventing relapse, providing an introduction to treatment concepts, analyzing the patient's progress in recovery, and discussing the treatment.

ACT protocol: i) creating a therapeutic connection, presenting the therapist and rationalizing the treatment approach, delivering clarifications regarding the treatment plan and how mental states affect the person, their family, and their connection with the illness manifestations; ii) psychological training, creative frustration, and the metaphor of falling into a well; iii) recognizing the values of the client, distinguishing them from their objectives, and clarifying the client's values and obstacles; iv)

examining the client's values and using relevant metaphors, making the right choices in life; v) psychological training on the concept of fault, checking the amount of fault in references, doing exercises for fault using related metaphors, and teaching to accept internal events; vi) receiving psychological education by clients on the concepts of role and context, as well as training in self-observation and self-awareness, which remains unchanged; vii) teaching effective communication and using the present moment, offering guidance on adopting a non-judgmental perspective and preparing for the future; viii) developing effective and developed action patterns, choosing the most valuable behaviors, examining the life story, and summarizing the treatment.

Tools

The researcher created a form to collect demographic information about the participants, which captured their gender, age, marital status, and education level.

The Perceived Stress Questionnaire is a self-report scale developed by Cohen and his team in 1983. This questionnaire aims to determine how individuals assess their difficult and tiring experiences. The scale comprises 14 items and asks people to rate how often they have felt a certain way over the past ten weeks on a five-point scale, ranging from 0 (never) to 4 (always). The internal consistency coefficients for each subscale and the total score range from 0.84 to 0.86. In a study of the questionnaire's Persian version, Cronbach's alpha coefficient was found to be 0.76 and 0.82 for validity (26, 27).

The Gastrointestinal Symptom Rating Scale (GSRS) is a tool used to assess digestive disorders by examining gastrointestinal symptoms and clinical experience. It consists of 15 questions, each graded on a Likert scale ranging from no discomfort to extreme discomfort. A higher score indicates more severe symptoms. Test-retest reliability of the GSRS ranged within 0.36–0.75 (28, 29).

The Morisky Medication Adherence Scale (MMAS-

8) is a tool designed by Morisky et al. in 2008 to assess treatment adherence. It is composed of eight questions and provides a single-item measurement of non-compliance with treatment. Each question is rated on a Likert scale, where a higher score suggests less compliance with treatment, while a score of zero indicates complete adherence to the prescribed treatment. The reliability of the scale, measured by Cronbach's alpha method, is 0.69, and its validity is 0.78 (30, 31).

Statistical analysis

The statistical analysis for this study was conducted using SPSS v24. Various tests were used to compare different aspects of the data. The chi-square test was employed to compare the demographic data of the participants, while t-tests and analysis of variance (ANOVA) were used to compare the pre-test and post-test scores of the participants. In addition, t-tests and ANOVA were utilized to compare the differences between the two treatment groups. All statistical analyses were performed using a significance level of $p < 0.05$.

Results

The study initially included 40 participants, but 5 participants from each group dropped out. Eventually, the analysis was conducted on 15 participants from each group. Of these, 12 patients (80%) in the UP group and 13 patients (86.7%) in the ACT group were women. The results of the Chi-square test indicated that there was no significant difference between the two groups ($X^2=0.24$, $P=0.62$). In addition, out of the 15 participants in the UP group, 11 (73.3%) were married, while out of the 15 participants in the ACT group, 8 (53.3%) were married. However, this difference was not statistically significant ($X^2=1.29$, $P=0.25$). Furthermore, 5 (33.3%) participants in the UP group had an academic education, while 13 (86.7%) participants in the ACT group had an academic

Table 1. Mean and standard deviation of research variables (n=30)

Variables	Stage	UP group (n=15)		ACT group (n=15)	
		Mean	Standard deviation	Mean	Standard deviation
Gastrointestinal symptoms	Pre-test	45.80	16.46	49.46	11.96
	Post-test	27.00	15.51	32.06	8.34
Perceived stress	Pre-test	35.60	7.87	38.13	7.61
	Post-test	24.60	9.31	25.53	4.89
Adherence	Pre-test	5.33	2.79	5.20	1.37
	Post-test	6.93	2.49	6.40	1.54

292 Comparing the effectiveness of transdiagnostic treatment with ACT on IBS patients

education, with this difference being statistically significant ($X^2=7.78$, $P=0.01$). The average age of the UP group was 33.47 (SD=6.68), while the average age of the ACT group was 33.67 (SD=3.73). According to an independent t-test, there was no significant difference in the ages of the two groups ($t=-0.10$, $p=0.92$). Table 1 reports the mean and standard deviation of the research variables.

Table 2 presents the results of the independent t-test for intergroup comparison of the research variables according to the stages of the research.

As outlined in Table 2, based on the independent t-test results, there is no significant difference between the research groups in the pre-test stage regarding research variables ($P>0.05$). In this regard, the dependent t-test was employed to compare research variables within the group. At first, the relevant presuppositions were checked and confirmed. Table 3 provides the dependent (paired) t-test results for the intra-group comparison of the research variables separately for the research groups.

As shown in Table 3, there is a significant difference between the pre-test and post-test stages of the UP group in terms of gastrointestinal symptoms ($t=3.05$). However, there was no significant difference for perceived stress ($t=-1.76$) and adherence ($t=-1.76$).

There was also a significant difference between the pre-test and post-test stages of the ACT group in terms of gastrointestinal symptoms ($t=5.58$), perceived stress ($t=6.65$), and adherence ($t=-2.35$) ($P\leq 0.001$).

Discussion

This study aimed to evaluate how two different treatments, UP and ACT, affected patients with IBS in terms of perceived stress, gastrointestinal symptoms, and medication adherence. The results indicated no significant difference in baseline between the clinical scores of the two groups. However, the UP group showed a significant improvement in gastrointestinal symptoms, while the ACT group saw a reduction in both gastrointestinal symptoms and perceived stress, as well as an increase in medication adherence. These results suggest that ACT was an effective therapy for reducing perceived stress. Stress is a major contributor to gastrointestinal problems, such as IBS, which is one of the most prevalent disorders in clinical practice (32-34).

Additionally, basic research indicates that stress has an impact on gastrointestinal function, leading to changes in gut motility. This not only affects the quality of life and gastrointestinal symptoms but also worsens gut-related symptoms, leading to a cycle of stress and chronic illness (35). In line with our results, a

Table 2. Independent t-test results for intergroup comparison of research variables by research stages (n=30)

Variables	Stage	Levene's test		Independent T-test			Confidence interval of 95%	
		F	P-Value	t	df	P-Value	Lower	Upper
Gastrointestinal symptoms	Pre-test	1.13	0.29	-0.69	28	0.49	-14.43	7.10
	Post-test	7.74	0.01	-1.11	28	0.27	-14.38	4.25
Perceived stress	Pre-test	0.06	0.81	-0.89	28	0.37	-8.32	3.25
	Post-test	8.16	0.01	-0.34	28	0.73	-6.49	4.63
Adherence	Pre-test	13.72	0.01	0.16	28	0.86	-1.51	1.78
	Post-test	1.54	0.22	0.70	28	0.48	-1.01	2.08

Table 3. The results of the dependent (paired) t-test for the intra-group comparison of research variables by research groups (n=30)

Variables	Group	Paired Differences		Confidence interval of 95%		Dependent t-test		Cohen's d
		Mean (SD)	Std. Error Mean	Lower	Upper	t	P-Value	
Gastrointestinal symptoms	UP (n=15)	18.80	6.15	5.60	31.99	3.05	0.01	0.78
	ACT (n=15)	17.40	3.11	10.71	24.08	5.58	0.01	1.44
Perceived stress	UP (n=15)	11.00	0.91	-3.55	0.35	-1.76	0.10	0.86
	ACT (n=15)	12.60	1.89	8.53	16.66	6.65	0.01	1.71
Adherence	UP (n=15)	-1.60	3.52	-3.55	0.35	-1.76	0.10	-0.45
	ACT (n=15)	-1.12	0.51	-2.30	-0.11	-2.35	0.03	-0.61

** $P<0.001$, * $P<0.01$

study conducted by MinKyeong et al. on the effect of ACT on perceived stress levels in seven patients with IBS found that ACT was an effective therapy for this group after ten sessions (36).

Regarding the treatment effect in this study, psychotherapy can help individuals better understand the connection between their emotional state and their physical health and can provide them with the tools needed to manage the psychological and emotional barriers that can interfere with adherence. Additionally, psychotherapy can help individuals develop a sense of empowerment and self-efficacy, which can be important factors in promoting adherence to medical treatments. By focusing on the individual's strengths and abilities, psychotherapy can help individuals develop a positive outlook and a belief in their ability to manage their health condition (37-40).

The results indicated that both therapies were effective in improving medication adherence. To benefit fully from effective medications, patients should follow treatment regimens closely (41-43). Adherence to treatment for chronic diseases is a concern in both developed and developing countries, with an average non-adherence rate of 50%. In the case of IBD, adherence data vary greatly depending on the study population (adults versus pediatric patients), the method of administration, and the method of measuring adherence. A systematic review of 17 studies involving adult IBD subjects found non-adherence to oral medications ranging from 7% to 72% (43). It has been observed that neglecting the advised treatment for IBD can result in worsening of the disease, recurrence of symptoms, reduced effectiveness of anti-TNF agents, higher morbidity and mortality rates, increased healthcare costs, inferior quality of life, and elevated disability levels (44).

Previous research supports our results and reveals that different types of cognitive behavioral therapy could enhance adherence. In a study conducted by Greenley et al., 76 young individuals on IBD maintenance medication were recruited. The families were randomly divided into two groups and received either 2 or 4 psychotherapy sessions. The study found a slight increase in adherence after two psychotherapy sessions for those who had imperfect baseline adherence. Additionally, a significant increase in adherence was observed for older adolescents after two

psychotherapy sessions (45). Other models of cognitive behavioral therapy, such as education, behavioral modification, motivational interviewing, and telemedicine, have also been proven to be effective in improving medication adherence (46-49).

Our study indicated that psychotherapy can help alleviate gastrointestinal symptoms. However, the evidence supporting the use of psychotherapy for IBS is mixed, and it has not been shown to improve physical symptoms or overall disease status in adult patients (50). Our results may be due to the indirect effects of psychotherapy, such as improving emotional disorders, which in turn had a significant impact on physical symptoms, and enhancing medication adherence for better treatment outcomes.

A growing body of research has assessed the effectiveness of interventions for IBS. Although IBS is primarily a physical ailment that has limited psychological and social factors, psychotherapeutic interventions can still be beneficial for patients. In the specialized field of clinical health psychology, all physical illnesses are treated using the biopsychosocial model. This approach takes into account a patient's medical, psychological, and social history to contextualize their symptoms and experiences. This approach is particularly useful for functional disorders such as IBS, as well as chronic diseases such as IBS that follow a cyclical pattern. Additionally, many patients with IBS experience functional gastrointestinal symptoms that may be especially sensitive to stress and other psychosocial factors.

The present study had some limitations that require addressing. Firstly, due to a lack of access to the participants and the online implementation of the research, there was no follow-up stage. Secondly, the sampling was not carried out randomly, and self-report tools were used. Thirdly, there was no control group. Thus, it is recommended that future research should consider a follow-up stage to assess the long-term effect of psychological treatments. Additionally, researchers should exercise caution in generalizing the results since the sampling was not conducted randomly in the initial stage. Lastly, it is suggested that a control group (waiting list) be included in future research to compare the effectiveness of psychological treatments.

Conclusion

This study aimed to evaluate the effectiveness of UP and ACT in reducing perceived stress, improving medication adherence, and alleviating gastrointestinal symptoms in patients with IBS. The results revealed no significant difference between the post-test results of UP and ACT concerning perceived stress, medication adherence, and gastrointestinal symptoms. However, both treatments were found to be effective, indicating that specialists should consider UP and ACT as essential psychological treatments for managing IBS.

Acknowledgements

The researchers are grateful to all the IBS patients who participated in the study. Moreover, the researchers are grateful to the Deputy of Research and Technology of Shahid Beheshti University of Medical Sciences for approving this research.

Ethics approval

The ethics committee of Shahid Beheshti University of Medical Sciences has approved current research under the code IR.SBMU.MSP.REC.1401.005. All the procedures were performed by the ethical standards of the committee responsible for human experiments (institutional and national) and with the Declaration of Helsinki of 1975, amended in 2000.

Conflict of interests

The authors declare that they have no competing interests.

References

1. Black CJ, Drossman DA, Talley NJ, Ruddy J, Ford AC. Functional gastrointestinal disorders: advances in understanding and management. *Lancet* 2020;396:1664-74.
2. Chey WD, Kurlander J, Eswaran S. Irritable bowel syndrome: a clinical review. *JAMA* 2015;313:949-58.
3. Coward S, Benchimol EI, Kuenzig ME, Windsor JW, Bernstein CN, Bitton A, et al. The 2023 impact of inflammatory bowel disease in Canada: epidemiology of IBD. *J Can Assoc Gastroenterol* 2023;6:9-15.
4. Szigethy E, Murphy SM, Ehrlich OG, Engel-Nitz NM, Heller CA, Henrichsen K, et al. Mental health costs of inflammatory bowel diseases. *Inflamm Bowel Dis* 2021;27:40-8.

5. Treynor W, Gonzalez R, Nolen-Hoeksema S. Rumination reconsidered: A psychometric analysis. *Cognitive Ther Res* 2003;27:247-59.
6. Borowitz SM. The epidemiology of inflammatory bowel disease: Clues to pathogenesis? *Front Pediatr* 2022;10:1103713.
7. Weaver KR, Melkus GD, Fletcher J, Henderson WA. Perceived stress, its physiological correlates, and quality of life in patients with irritable bowel syndrome. *Biol Res Nurs* 2018;20:312-20.
8. Targownik LE, Sexton KA, Bernstein MT, Beatie B, Sargent M, Walker JR, Graff LA. The relationship among perceived stress, symptoms, and inflammation in persons with inflammatory bowel disease. *Am J Gastroenterol* 2015;110:1001-12; quiz 13.
9. Bernstein CN, Singh S, Graff LA, Walker JR, Miller N, Cheang M. A prospective population-based study of triggers of symptomatic flares in IBD. *Am J Gastroenterol* 2010;105:1994-2002.
10. Li L, Peng P, Ding N, Jia W, Huang C, Tang Y. Oxidative stress, inflammation, gut dysbiosis: what can polyphenols do in inflammatory bowel disease? *Antioxidants* 2023;12:967.
11. Cash BD, Pimentel M, Rao SS, Weinstock L, Chang L, Heimanson Z, Lembo A. Repeat treatment with rifaximin improves irritable bowel syndrome-related quality of life: a secondary analysis of a randomized, double-blind, placebo-controlled trial. *Therap Adv Gastroenterol* 2017;10:689-99.
12. Cassell B, Gyawali PC, Kushnir VM, Gott BM, Nix BD, Sayuk GS. Beliefs about GI medications and adherence to pharmacotherapy in functional GI disorder outpatients. *ACG* 2015;110:1382-7.
13. Iuga AO, McGuire MJ. Adherence and health care costs. *Risk Manag Healthc Policy* 2014;7:35-44.
14. Sherwin LB, Deroche CB, Krisanabud P, Matteson-Kome M, Bechtold M, Ruppert T. Adherence to short-course pharmacotherapy in adults with irritable bowel syndrome. *West J Nurs Res* 2020;42:524-34.
15. Tripathi R, Mehrotra S. Irritable bowel syndrome and its psychological management. *Ind Psychiatry J* 2015;24:91.
16. Farchione TJ, Fairholme CP, Ellard KK, Boisseau CL, Thompson-Hollands J, Carl JR, et al. Unified protocol for transdiagnostic treatment of emotional disorders: a randomized controlled trial. *Behav Ther* 2012;43:666-78.
17. Abasi I, Fata L, Sadeghi M, Banihashemi S, Mohammadee A. A comparison of transdiagnostic components in generalized anxiety disorder, unipolar mood disorder and nonclinical population. *Int J Psychol Sci* 2013;7:803-11.

18. Benuto LT, Farchione T, Cardona ND, Segovia FR, Casas J, Reyes SR. Exploring the effectiveness of the unified protocol for transdiagnostic treatment of emotional disorders with latinxs: a record-review study at a culturally specific clinic for latinxs. *Cogn Behav Pract* 2023.
19. Bravo Ferreira N, Eugenicos M, Graham Morris P, Gillanders D. Using acceptance and commitment therapy in irritable bowel syndrome. *Gastrointestinal Nursing* 2011;9:28-35.
20. Hayes SC, Pistorello J, Levin ME. Acceptance and commitment therapy as a unified model of behavior change. *Counseling Psychologist* 2012;40:976-1002.
21. Hayes SC, Strosahl KD, Wilson KG. Acceptance and commitment therapy: American Psychological Association; 1999.
22. Mohsenabadi H, Zanjani Z, Shabani MJ, Arj A. A randomized clinical trial of the Unified Protocol for Transdiagnostic treatment of emotional and gastrointestinal symptoms in patients with irritable bowel syndrome: evaluating efficacy and mechanism of change. *J Psychosom Res* 2018;113:8-15.
23. Barlow DH, Ellard KK, Fairholme CP. Unified protocol for transdiagnostic treatment of emotional disorders: Workbook: Oxford University Press; 2010.
24. Reisi S, Ahmadi SM, Foroughi A, Bahrami R, Parvizifard A. Transdiagnostic therapy compared to progressive muscle relaxation on the emotional health of mothers with premature infants: A randomized controlled trial. *Int J Psychiatry Med* 2024;59:112-30.
25. Danesh-Mirkohan RA, Taklavi S, Kazemi R. Comparing the effectiveness of acceptance and commitment therapy with mindfulness based cognitive therapy, on self-control and emotional flexibility in women with compulsive buying. *Rooyesh-e-Ravanshenasi Journal* 2021;10:13-24.
26. Safaei H. Assessing Stress in Cancer Patients: Factorial Validity of the Perceived Stress Scale in Iran. *IJPN* 2014;2:13-22.
27. Cohen S, Kamarck T, Mermelstein R. Perceived stress scale. *Measuring stress: A guide for health and social scientists*. 1994;10:1-2.
28. Kulich KR, Madisch A, Pacini F, Piqué JM, Regula J, Van Rensburg CJ, et al. Reliability and validity of the Gastrointestinal Symptom Rating Scale (GSRS) and Quality of Life in Reflux and Dyspepsia (QOLRAD) questionnaire in dyspepsia: a six-country study. *Health Qual Life Outcomes* 2008;6:12.
29. Mazaheri M, SadatKhoshouei M. Comparison between psychometric characteristics of Persian version of the gastrointestinal symptoms rating scale in functional gastrointestinal disorders and normal groups. *Govareh* 2012;17:18-24.
30. Moharamzad Y, Saadat H, Shahraki BN, Rai A, Saadat Z, Aerab-Sheibani H, et al. Validation of the Persian version of the 8-item Morisky Medication Adherence Scale (MMAS-8) in Iranian hypertensive patients. *Glob J Health Sci* 2015;7:173.
31. Moon SJ, Lee WY, Hwang JS, Hong YP, Morisky DE. Accuracy of a screening tool for medication adherence: a systematic review and meta-analysis of the Morisky Medication Adherence Scale-8. *PLoS One* 2017;12:0187139.
32. Lee SP, Sung IK, Kim JH, Lee SY, Park HS, Shim CS. The effect of emotional stress and depression on the prevalence of digestive diseases. *J Neurogastroenterol Motil* 2015;21:273-82.
33. Konturek PC, Brzozowski T, Konturek SJ. Stress and the gut: pathophysiology, clinical consequences, diagnostic approach and treatment options. *J Physiol Pharmacol* 2011;62:591-9.
34. Qin HY, Cheng CW, Tang XD, Bian ZX. Impact of psychological stress on irritable bowel syndrome. *World J Gastroenterol* 2014;20:14126-31.
35. Gaylord SA, Palsson OS, Garland EL, Faurot KR, Coble RS, Mann JD, et al. Mindfulness training reduces the severity of irritable bowel syndrome in women: results of a randomized controlled trial. *Am J Gastroenterol* 2011;106:1678-88.
36. Jo M, Son C. Effects of acceptance and commitment therapy (ACT) on IBS-symptoms, stress, quality of life, and acceptance-action of people with irritable bowel syndrome. *J Digit Converg* 2018;16:501-9.
37. DiMatteo MR. Social support and patient adherence to medical treatment: a meta-analysis. *Health Psychol* 2004;23:207-18.
38. Kissane D. Beyond the psychotherapy and survival debate: the challenge of social disparity, depression and treatment adherence in psychosocial cancer care. *Psychooncology* 2009;18:1-5.
39. Castro A, Gili M, Ricci-Cabello I, Roca M, Gilbody S, Perez-Ara MA, et al. Effectiveness and adherence of telephone-administered psychotherapy for depression: A systematic review and meta-analysis. *J Affect Disord* 2020;260:514-26.
40. Gold SM, Kohler-Forsberg O, Moss-Morris R, Mehnert A, Miranda JJ, Bullinger M, et al. Comorbid depression in medical diseases. *Nat Rev Dis Primers* 2020;6:69.
41. Vrdoljak J, Vilovic M, Zivkovic PM, Tadin Hadjina I, Rusic D, Bukic J, et al. Mediterranean Diet

296 Comparing the effectiveness of transdiagnostic treatment with ACT on IBS patients

Adherence and Dietary Attitudes in Patients with Inflammatory Bowel Disease. *Nutrients* 2020;12:3429.

42. Sabaté E. Adherence to long-term therapies: evidence for action: World Health Organization; 2003.

43. Jackson C, Clatworthy J, Robinson A, Horne R. Factors associated with non-adherence to oral medication for inflammatory bowel disease: a systematic review. *ACG* 2010;105:525-39.

44. Chan W, Chen A, Tiao D, Selinger C, Leong R. Medication adherence in inflammatory bowel disease. *Intest Res* 2017;15:434-45.

45. Greenley RN, Gumidyala AP, Nguyen E, Plevinsky JM, Pouloupoulos N, Thomason MM, et al. Can you teach a teen new tricks? Problem solving skills training improves oral medication adherence in pediatric patients with inflammatory bowel disease participating in a randomized trial. *Inflamm Bowel Dis* 2015;21:2649-57.

46. Cook PF, Emiliozzi S, El-Hajj D, McCabe MM. Telephone nurse counseling for medication adherence

in ulcerative colitis: a preliminary study. *Patient Educ Couns* 2010;81:182-6.

47. Hommel KA, Hente EA, Odell S, Herzer M, Ingerski LM, Guilfoyle SM, Denson LA. Evaluation of a group-based behavioral intervention to promote adherence in adolescents with inflammatory bowel disease. *Eur J Gastroenterol Hepatol* 2012;24:64-9.

48. Moshkovska T, Stone MA, Smith RM, Bankart J, Baker R, Mayberry JF. Impact of a tailored patient preference intervention in adherence to 5-aminosalicylic acid medication in ulcerative colitis: results from an exploratory randomized controlled trial. *Inflamm Bowel Dis* 2011;17:1874-81.

49. Elkjaer M, Shuhaibar M, Burisch J, Bailey Y, Scherfig H, Laugesen B, et al. E-health empowers patients with ulcerative colitis: a randomised controlled trial of the web-guided 'Constant-care' approach. *Gut* 2010;59:1652-61.

50. von Wietersheim J, Kessler H. Psychotherapy with chronic inflammatory bowel disease patients: a review. *Inflamm Bowel Dis* 2006;12:1175-84.