SJMS
Shahroud Journal of Medical Sciences

The Effectiveness of Cognitive-Behavioral Stress Management and Grammatical Mental Imagery with Cognitive Processing on Negative Mood, Cognitive Regulation of Emotion and Quality of Life in Patients with Irritable Bowel Syndrome

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Abstract

Background: *Irritable bowel syndrome (IBS) is a common gastrointestinal dysfunction with some psychological disorders. This study aimed to compare the effectiveness of cognitive-behavioral stress management (CBSM) and grammatical mental imagery with cognitive processing on reducing negative mood (depression and anxiety), cognitive regulation of emotion, and quality of life (QoL) in patients with IBS.*

Methods: *The study was a quasi-experimental one with pre-test and post-test and a control group. The statistical population included all male and female patients with IBS referred to besat gastroenterology clinic in Tehran. The sample size of the present study was estimated to be 75 people who were randomly assigned to the CBSM group (n=25), the grammatical imaging experiment with cognitive processing (n=25), and the control group (n=25) by lottery method without replacement. The cognitive emotion regulation questionnaire (CERQ), life quality questionnaire (SF-36), Beck's depression inventory, and the spielberger state-trait anxiety inventory (STAI) was used to collect data.*

Results: *The results of covariance analysis showed that CBSM therapy and grammatical mental imagery with cognitive processing were effective in reducing negative mood (depression and anxiety), cognitive regulation of emotion, and QoL (Pvalue=0.001). The results of covariance analysis also showed a significant difference between CBSM and grammatical mental imagery with cognitive processing only in terms of QoL. There was no significant difference between CBSM and grammatical mental imagery with cognitive processing in reducing negative mood (depression and anxiety), and cognitive emotion regulation.*

Conclusions: *According to the results, CBSM therapy and grammatical mental imagery with cognitive processing increase the QoL and reduce negative emotions in patients with IBS.*

Keywords: Grammatical mental imagery, Cognitive-behavioral, Stress management, Quality of life, Irritable bowel syndrome.

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Introduction

Irritable bowel syndrome (IBS) is one of the most common gastrointestinal diseases that affect a significant part of the population. Although there are no specific organic causes in this disease, symptoms such as chronic abdominal pain, nausea, vomiting, diarrhea, constipation, or bloating in the absence of any physical or physiological cause affect the patients' quality of life (QoL).[1,2] Risk factors for this disorder include gastroenteritis, depression, life-threatening events, self-illness, female gender, young age, estrogen use in the postmenopausal period, recent antibiotic use, food intolerance, and extraintestinal physical symptoms.[3] Psychological symptoms, although not in themselves part of IBS, play an important role in the clinical course and clinical consequences of IBS.[4] Some studies show that psychological aggravating factors such as anxiety, mood disorders, depression, and stress may increase the intensity of disease symptoms.[5] A group of researchers believes that half of those with IBS can be described as depressed, anxious, and self-ill, but no clear psychiatric diagnosis is prevalent.[6]

Patients with IBS who seek treatment for symptoms have emotional problems such as anxiety, depression, and neurotic personality traits.[7] Therefore, emotional symptoms and a kind of emotion regulation are considered as inseparable and specific symptoms of this syndrome. Some studies show that anger can have a significant effect on antral intestinal motility in IBS.[8]

Emotion regulation plays a prominent and important role in adapting to stressful life events and the biological and psychological consequences of individuals. Emotion regulation techniques help a person become aware of their emotions, accept them, and better regulate their emotions.[9] The main purpose of examining emotion regulation is cognitive assessment, which involves reinterpreting emotion-evoking situations in a way that modulates or modifies the emotional effect.[10] Theoretical models in this field show that successful emotional regulation is associated with good health outcomes and improved relationships, as well as good academic and professional performance.

One of the effective psychological therapies in improving IBS is cognitive-behavioral stress management (CBSM) training. Behavioral methodological stress management training is a multifaceted approach in which various techniques such as relaxation, imagery, and other anxiety reduction techniques with common cognitive-behavioral approaches such as cognitive reconstruction, coping effectiveness training, expression training, and management can be combined.[11] Stress management techniques have been used successfully for many emotional and physical problems such as anxiety, depression, insomnia, and diabetes.[12]

One of the relatively new psychological therapies in this field is grammatical mental imagery with cognitive processing, which was developed in 1995.[13] This method helps patients overcome negative thoughts and disturbing memories through cognitive reprocessing. This method helps people to get rid of psychological stress by expressing negative thoughts and disturbing images and then by cognitive reprocessing.[13] Therefore, this method is considered as one of the appropriate treatment methods for patients with gastrointestinal diseases, which can reduce stress, anxiety, depression, dysfunctional attitudes, negative thoughts and pain control, and the feeling of being in control of the disease.[14]

Because psychotherapy in medical illnesses can reduce the need for costly medical services and improve the mental health of patients, design and implement interventions based on effective and beneficial psychotherapy approaches to medical and chronic illnesses. Psychotherapy can help relieve the current stressors of IBS or discover and heal important events before a person's life.[15,16] Therefore, according to what has been said, the present study aimed to compare the effectiveness of stress management with cognitive-behavioral methods and grammatical mental imagery with cognitive processing on reducing anxiety and cognitive regulation of emotion in patients with IBS.

Materials and Methods

The study was a quasi-experimental one with pre-test and post-test and a control group. The statistical population included all male and female patients with IBS referred to Besat Gastroenterology Clinic in Tehran in 2019. To obtain the sample size, power G software was used, which according to the effect size of 0.5, alpha coefficient of 0.05, and statistical study power of 0.80, the sample size of the present study was estimated to be 75 people who were randomly selected by lottery method without replacement in two experimental groups (receiving CBSM and grammatical mental imagery with cognitive processing) and a control group (n=25). Thus, the criteria for inclusion of patients with IBS included an age range of 20 to 55 years, and not taking psychiatric drugs during the last month. To observe the ethical considerations and the rights of the subjects, it was first explained to the groups separately that the present study is scientific research and they can participate in it if they wish, so they completed a written informed consent. They were also assured that all information received from them would remain confidential.

The cognitive emotion regulation questionnaire (CERQ): CERQ was developed by Garnefski et al.[17] This questionnaire contains 36 five-point graded questions (always or never) and has a special form for adults and children. The CER scale assesses nine cognitive strategies of self-blame, acceptance, rumination, positive refocusing, refocus on planning, positive reappraisal, perspective, catastrophizing, and blaming others. The alpha coefficient for the subscales of this questionnaire was reported by Garnefski et al.[17] in the range of 0.71 to 0.81.[18]

The Spielberger state-trait anxiety inventory (STAI): This questionnaire was developed by Spielberger[19] to measure the severity of anxiety. STAI questionnaire includes two psychometric scales that measure trait anxiety and situational anxiety. This questionnaire has 40 questions. The situational anxiety scale consists of 20 sentences and individuals are asked to report how they felt at the time of the questionnaire. The severity of feelings of mental anxiety is determined by a four-point Likert scale (very low, low, high, very high). The trait anxiety scale also includes 20 sentences that a person should describe most of the time. The frequency of symptoms of anxiety experienced is determined by four degrees (almost never, sometimes, most of the time, and almost always).[19] The internal consistency of the situational and trait anxiety scales is relatively high with an Alpha coefficient of 0.90.[19]

Life quality questionnaire (SF-36): The quality of life questionnaire was designed by Varosherbon (1992) by assessing health status from both physical and mental conditions. The questionnaire has 36 items that assess eight different areas of health including general health, physical function, role limitation for physical reasons, role limitation for emotional reasons, bodily pain, social function, fatigue or cheerfulness, and mental health. The reliability test of the questionnaire was evaluated using statistical analysis of "internal consistency" and the validity test was evaluated using the methods of "known group comparison" and "convergence validity". "Internal consistency" analysis showed that except for the vitality scale ($\alpha=0.65$), other Persian species QoL scales have the minimum standard coefficients of reliability in the range of 0.77 to 0.90.[20] Cronbach's alpha coefficient, which indicates the reliability of the internal consistency of the questions, was 0.7 or higher for all measurements, and only for the vitality measure, the coefficient was lower than the recommended size ($\alpha=0.65$).[20]

Beck's depression inventory: This tool is used to assess the severity of the subjects' current depressive symptoms. This is a 21-item scale questionnaire that the subjects themselves answer the questions and the subjects are asked to number the severity of their depressive symptoms based on the Likert scale. The Beck depression inventory has a positive correlation (0.75) with the Hamilton scale for depression rating, which indicates good agreement. In addition, the reliability (r) of the one-week Beck depression inventory was 0.93. Internal consistency of the test was also reported to be high (0.91).[21]

The members of the two intervention groups received CBSM treatments based on the protocol of Anthony and also grammatical mental imagery with cognitive processing based on the Smoker protocol in 8 sessions of 90 minutes per week. The details of the interventions are summarized in tables 1 and 2. In the end, the situation of each endpoint parameter before and after the intervention was assessed in each group and compared across the groups.

Quantitative study variables were described based on mean and standard deviation. Paired t-test was used to evaluate the differences in quantitative variables before and after the intervention. Multivariate analysis of covariance (MANCOVA) was used to evaluate the effectiveness of stress management on reducing negative mood (depression and anxiety), cognitive regulation of emotion, and QoL in patients with IBS. To examine the assumptions of multivariate analysis of covariance, Levene's test was used, and to investigate the equality, the variance of the error of the two groups was used. Statistical analysis was performed using SPSS$_{22}$ software. The significant level was set at 0.05.

Table 1. The structure of CBSM therapy sessions

Session	Content
First	General acquaintance with the members, the introduction of the therapist, acquaintance of the members with the group flow and explanation of the therapeutic goals, acquaintance with the rules of the sessions, and agreement on the time of formation, number, and duration of therapy sessions taking a pre-test. Introducing the training program, introducing the first stress component and the first gradual muscle relaxation exercise for 16 muscle groups
Second	Effects of stress, the practice of increasing awareness of physical symptoms of stress and practice of gradual muscle relaxation, members' awareness of their specific responses and patterns of anger, anger management training, the introduction of mantra meditation practice
Third	The session tries to use examples of current stress in the lives of the participants. Teaching effective communication, barriers and steps of expressive behavior, and how to deal with conflicts using problem-solving skills.
Fourth	Relationship of thoughts and emotions, emotions and bodily sensations, how to change your assessments in stressful situations to stop negative thoughts, homework
Fifth	Assessing homework, identifying negative thoughts, identifying the type of distortion, how to combine imaging with diaphragmatic breathing, and gradually relaxing muscles.
Sixth	Assess homework, teach the difference between logical and irrational self-talk, recognize and identify each one, and teach five steps to replace logical thoughts
Seventh	Applying cognitive review, the technique of mental rotation with reprocessing in order to control recurrent mental sparks and change the meanings of traumatic events, review of homework
Eighth	Assessing homework, introducing effective and inefficient coping strategies, getting acquainted with the best type of coping for different types of stressors and identifying the coping style of each member, evaluating the members' social support network, identifying obstacles in creating and maintaining a social support network. Summarize and conclude with the help of couples, post-test

Table 2. Structure of grammatical processing grammatical imaging therapy sessions

Session	Content
First	General acquaintance with the members, introduction of the therapist, acquaintance of the members with the group flow and explanation of the therapeutic goals, acquaintance with the rules of the sessions and agreement on the time of formation, number and duration of therapeutic sessions, taking a pre-test, provide an overview of IRRT and its role with psychological symptoms such as negative spontaneous thoughts, insomnia, unpleasant feelings
Second	Help identify negative thoughts and visualize annoying images and how moods, thinking, and behaviors overshadow insomnia, giving homework
Third and fourth	Examine homework, visualize annoying thoughts and images in full detail and with your eyes closed, muscle relaxation conditions and their relationship with mood and insomnia, give homework
Fifth	Homework review, guided mental instruction training, and instructions from the therapist in order to control negative thoughts and annoying images and create positive images, give homework
Sixth	Examining homework, teaching cognitive review techniques and mind rotation techniques along with cognitive reprocessing, in order to eliminate negative spontaneous thoughts and create positive thoughts and moods
Seventh	Applying cognitive review, mind rotation technique with reprocessing to control recurrent mental sparks and change the meanings of traumatic events, homework review
Eighth	Check homework, control recurring mental sparks, flashbacks, continuous use of mind rotation technique with changes in the meanings of annoying thoughts and images in order to find positive thoughts, feelings and moods, conclusion and final conclusion with the help of couples, post-test

Results

Table 3 shows the descriptive information (mean and standard deviation) related to the variables of depression, anxiety, cognitive regulation of emotion, and QoL. The mean of depression, anxiety, and negative and positive cognitive strategies and QoL of the experimental and control groups in the pre-test is close but in the post-test, the mean of depression, anxiety, and negative cognitive strategies in the stress management group by cognitive-behavioral and grammatical mental imagery processing methods were less than the average of the control group. Also, the mean of positive cognitive strategies and QoL in the stress management group with cognitive-behavioral and grammatical mental imagery with cognitive processing is higher than the mean of the control group.

Multivariate analysis of covariance (MANCOVA) was used to compare the effectiveness of CBSM and grammatical mental imagery with cognitive processing on reducing negative mood (depression and anxiety) and cognitive regulation of emotion and QoL in patients with IBS. To evaluate the assumptions of multivariate analysis of covariance, Levene's test was used, and

to examine equality, error variance of the three groups was used. Homogeneity analysis of variance showed that the significance of Levene's test in the scores of anxiety, depression, cognitive regulation of emotion, and QoL was more than 0.05. Due to this, the assumption of homogeneity of error variances in the studied groups has been realized. Investigating the homogeneity of the regression line slope also supported the insignificance of the interaction of conditions and pre-test. The results of multivariate analysis of covariance showed a significant difference between the experimental and control groups in terms of research variables in the post-test after controlling the pre-test scores. There was a significant difference between the experimental and control groups in at least one of the post-test research variables after controlling the pre-test indices. Multivariate analysis of covariance was used to investigate the effects of CBSM and grammatical mental imagery with cognitive processing on study parameters. Examining the differences between experimental and control groups indicated that by eliminating the effect of pretests, there was a significant difference between all three groups in the variables of anxiety, depression, negative cognitive strategies, positive cognitive strategies, and QoL (Table 4).

In comparing the pairs between the groups, it was found a significant difference between the experimental groups and the control group in the mean anxiety score (Pvalue=0.001) but there was no significant difference between CBSM and grammatical mental imagery and cognitive processing in changing anxiety score (Pvalue=0.300). There was a significant difference between the experimental and the control groups in the mean depression score (Pvalue=0.001), but without a significant difference between CBSM with grammatical mental imagery and cognitive processing in improving depression score (Pvalue=0.212). In the two-way comparison between the groups, it was found a significant difference between the experimental groups and the control group in the variable of negative cognitive strategies (Pvalue=0.001), but no significant

difference was revealed between CBSM and grammatical mental imagery and cognitive processing in the terms of negative cognitive strategies (Pvalue=0.616). Also, there was a significant difference between the experimental groups and the control group in positive cognitive strategies (Pvalue=0.001), but no significant difference was indicated between CBSM with grammatical mental imagery and cognitive processing in the variable of positive cognitive strategies (Pvalue=0.097). Finally, the pairwise comparison between the groups showed a significant difference between the experimental groups and the control group in the QoL parameter (Pvalue=0.001). There was also a significant difference between CBSM with grammatical mental imagery and cognitive processing in the QoL variable (Pvalue=0.001).

Table 3. Descriptive information about the variables of depression, anxiety, cognitive regulation of emotion, and QoL by groups

Variable	Phase	Control		Grammatical imagery		Cognitive-behavioral	
		Mean	SD	Mean	SD	Mean	SD
Depression	Pre-test	22.80	2.62	23.16	2315	23.01	2.49
	Post-test	22.73	2.76	23.60	2.99	17.60	2.99
Anxiety	Pre-test	82.13	3.39	81.80	3.02	81.25	3.02
	Post-test	83.73	2.77	68.86	3.75	66.86	3.75
Positive cognitive strategies	Pre-test	42.26	3.43	41.40	3.75	43.23	3.75
	Post-test	41.40	3.73	46.01	4.10	74.21	4.10
Negative cognitive strategies	Pre-test	39.20	6.52	38.92	8.86	38.14	8.86
	Post-test	40.12	7.63	35.48	9.63	36.17	9.63
QoL	Pre-test	153.43	8.60	151.50	47.64	65.90	52.41
	Post-test	161.39	8.93	175.85	11.78	13.23	16.53

Table 4. Results of multivariate analysis of covariance the difference between experimental and control groups in research variables

Variable	MS	F	Pvalue	Effect size
Anxiety	258.13	31.15	0.001	0.422
Depression	282.84	25.11	0.001	0.364
Positive cognitive strategies	97.06	9.54	0.020	0.279
Negative cognitive strategies	3139.46	14.19	0.001	0.335
QoL	7112.39	42.11	0.001	0.497

Discussion

This study aimed to compare the effectiveness of CBSM and grammatical mental imagery with cognitive processing on reducing negative mood (depression and anxiety), cognitive regulation of emotion, and QoL in patients with IBS. The results showed that there was no significant difference between the effectiveness of CBSM and grammatical mental imagery with cognitive processing on reducing negative mood (depression and anxiety) as similarly shown by Kush et al.[22], Kennedy et al.[23], and Gross et al.[24].

In patients with IBS, in order to achieve adjustment, patients with pain and discomfort due to their disease experience various changes such as the level of daily activities, physical reactions such as sleep disturbance, and changes in thinking or emotions and, of course, reactions such as reduced activity levels may have long-term consequences.[25] When a patient experiences pain, bloating, constipation, or diarrhea, how he or she thinks about the symptoms of his or her illness affects his or her level of anxiety. Negative thoughts about your illness may increase the patient's anxiety and lead to more severe symptoms that manifest in behaviors such as increased

doctor visits.[23] Behaviors such as changing diets, focusing on symptoms, avoiding social situations to control and reduce symptoms, or avoiding the consequences of illness that may result from patients' embarrassment and embarrassment may put patients in a vicious circle of fear and avoidance. In fact, physiological, cognitive, and behavioral responses are interdependent and are a factor in disease persistence; therefore, changing cognition, behavior, or both can potentially improve patients, and cognitive reconstruction techniques can be helpful. Cognitive-behavioral therapy reduces the depression and anxiety of patients with IBS by correcting dysfunctional beliefs and cognitive errors, and improves the mental state of patients to help reduce the severity of symptoms.[23] Therefore, it can be said that this comprehensive program has intervened in two basic cognitive and physiological dimensions of stress and thus has been able to reduce patients' anxiety and depression.

Regarding the effectiveness of grammatical mental imagery with cognitive processing, many therapists such as Hackman[26] believe that grammatical mental imagery with cognitive processing has a negative effect on psychiatric symptoms that are more cognitive, such as depression, rumination, and

spontaneous thoughts. Therefore, the effectiveness of grammatical mental imagery with cognitive processing on negative spontaneous thoughts can be due to the use of more cognitive mechanisms with reprocessing and changes in the meanings of stressful events and thoughts. In this regard, Arntz[27] believed that grammatical mental imagery with cognitive processing is one of the effective therapies in controlling negative spontaneous thoughts and mental rumination, because in this treatment, the process of information processing, mental screening, and mental inhibition is used by the patient in several sessions to control negative thoughts and images, and the patient can have effective stress control after a while on recurring mental sparks and event-related flashbacks.

The results showed that there was no significant difference between the effectiveness of CBSM and grammatical mental imagery with cognitive processing on cognitive emotion regulation, consistent with the findings of Colby and Shifren.[28] It can be said that in this treatment, patients with IBS learned to improve their cognitions, feelings, and reactions to the emotional state and communication with society, and with a realistic and positive assessment of the situation that increases their tolerance and flexibility in the face of challenges. Moreover, practicing grammatical illustration skills with cognitive processing, in the long run, can lead to significant cognitive changes. Because in this method, the patient records his unpleasant mental components daily after each treatment session and also records the related reactions. By analyzing the expression of emotions, visualizing and changing their meanings, it was gradually achieved the dominant and dominant pleasant ideas.[29]

Finally, the results showed that grammatical mental imagery with cognitive processing was significantly more effective on QoL compared to cognitive-behavioral stress management, which is consistent with Hunt et al. study.[30] In the explanation, it can be said that QoL is a psychological variable that changes from person to person. In this study, many techniques were used with grammatical illustration therapy, which directly affected the small but effective changes in improving people's perception of life. In imaging training, patients with IBS learn to use the gradual contraction-relaxation method during stressful days, which is their leisure time, and to use this technique several times during the day, depending on their condition. Most patients with IBS have a positive view of these techniques and positive feedback.

In conclusion, CBSM therapy and grammatical mental imagery with cognitive processing increase the QoL and reduce negative emotions in patients with IBS.

Acknowledgement

Conflict of Interest

The authors declare that they have no conflict of interest.

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