

## Original Paper

# The Effectiveness of Acceptance and Commitment-Based Therapy on the Immune Function and Activity Limitations in Patients With Irritable Bowel Syndrome



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**Citation:** Shakernejad S, Khalatbari J, Alilou MM. The Effectiveness of Acceptance and Commitment-Based Therapy on the Immune Function and Activity Limitations in Patients With Irritable Bowel Syndrome. *Journal of Holistic Nursing And Midwifery*. 2021; 31(4):271-279. <http://dx.doi.org/10.32598/jhnm.31.4.2166>

**Running Title:** Acceptance and Commitment Therapy in Patients With Irritable Bowel Syndrome

**doi**: <http://dx.doi.org/10.32598/jhnm.31.4.2166>



## ABSTRACT

**Introduction:** Irritable bowel syndrome is the most common, costly, and disabling dysfunction of the gastrointestinal tract. Mental disorders can be one of the main factors in the onset, continuation, or exacerbation of gastrointestinal signs and symptoms in people with this syndrome. Commitment and acceptance therapy is a mixture of four approaches of awareness, acceptance, commitment, and behavior change, and its overall goal is to achieve psychological flexibility to move towards thought-based behavior. This treatment focuses less on reducing symptoms and more on improving the quality of life.

**Objective:** This study aimed to determine the effectiveness of acceptance and commitment-based therapy on the immune function and activity limitations in patients with irritable bowel syndrome.

**Materials and Methods:** This study was a quasi-experimental research with a pre-test, post-test design and a control group. Thirty patients with irritable bowel syndrome were randomly selected from those referred to a hospital clinic in Tabriz City, Iran. They were randomly divided into the intervention and control groups (15 in each group). The intervention group received acceptance and commitment group therapy for 8 sessions, while the control group did not receive any intervention. Both groups were assessed before and after the intervention, and in the follow-up phase using the activity limitations subscale of quality of life questionnaires (to measure activity limitations) and stool calprotectin test to assess safety performance. Data analysis was performed using descriptive statistics indices (mean and standard deviation) and analysis of variance with repeated measures, Bonferroni test, and analysis of covariance to test the study hypotheses.

**Results:** The Mean $\pm$ SD age of the intervention group was  $34.53\pm18.38$  years, and the Mean $\pm$ SD age of the control group was  $42.80\pm17.97$  years. The significance levels of Levene's and the Shapiro-Wilk test for all variables were greater than 0.05. Based on the results, the Mean $\pm$ SD score of the activity limitations variable in the intervention group was  $7.53\pm4.24$  in the pre-test,  $17.66\pm3.41$  in the post test, and  $17.26\pm3.65$  in the follow-up. According to the results, activity limitations ( $P=0.027$ ) and safety performance ( $P=0.034$ ) were significantly different before and after the intervention.

**Conclusion:** The present study's findings show that acceptance and commitment-based therapy can play an influential role in improving patients' immune function and promoting their activity limitations. Therefore, this treatment is recommended as a complementary therapy in patients with irritable bowel syndrome.

### Keywords:

Acceptance and commitment therapy, Irritable bowel syndrome, Activity limitation

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## Highlights

- Irritable bowel syndrome is the most common, costly, and debilitating functional gastrointestinal disorder.
- Psychiatric disorders can be a significant factor in the onset, persistence, or exacerbation of gastrointestinal signs and symptoms in people with irritable bowel syndrome.
- One of the behavioral therapies is acceptance and commitment therapy, which focuses less on reducing symptoms and more on improving the quality of life.
- The present study's findings show that acceptance and commitment-based therapy can play an influential role in improving patients' immune function and promoting their activity limitations.

## Plain Language Summary

Irritable bowel syndrome is a type of bowel dysfunction characterized by discomfort and pain associated with defecation and changes in bowel habits. Its prevalence is 10% to 20% in the general population and is the most common, costly, and disabling functional gastrointestinal disorder. It accounts for 30% to 50% of referral patients. Psychological factors are always considered one of the main factors in the occurrence and continuation of this disease. On the other hand, individuals with mental disorders have reported gastrointestinal symptoms consistent with irritable bowel syndrome. Therefore, it seems that mental illnesses can be one of the main factors in the onset, continuation, or exacerbation of gastrointestinal signs and symptoms in people with this syndrome. One of the behavioral therapies is acceptance and commitment therapy, in which there is little emphasis on changing the content of the therapist's thoughts. Instead, there is a lot of emphasis on the acceptance of cognitions. This treatment is less focused on reducing symptoms and more on improving quality of life. Some researchers believe that using this method in combination with traditional cognitive behavioral therapy techniques can increase the effectiveness of treatment while reducing the symptoms of the disease. The current study results also showed that acceptance and commitment-based therapy could play an influential role in improving the immune function of patients and promoting their activity limitations.

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## Introduction

Irritable Bowel Syndrome (IBS) is a debilitating, chronic, and recurrent gastrointestinal dysfunction characterized by recurrent and chronic periods of abdominal pain or discomfort, bloating, and changes in bowel movements without structural disorders [1]. Studies showed that its overall prevalence is 10% to 20% of the total population and is one of the most common and unknown psychiatric disorders in the field of gastrointestinal diseases [2]. Irritable bowel syndrome is the most common, costly, and debilitating functional disorder of the gastrointestinal tract. This syndrome imposes significant costs on the individual and society, both directly due to the symptoms of irritable bowel syndrome and its associated disorders and indirectly due to absence from work. Irritable bowel syndrome is essential due to chronic pain and discomfort, absenteeism, social fear, and adverse effects on quality of life [3].

This syndrome is one of the most common reasons for patients referring to gastroenterologists and accounts for 30% to 50% of referral patients. Psychological factors are always considered one of the essential factors in the occurrence and continuation of this disease. People with IBS have reported significant symptoms of psychological disorders, abnormal personality traits, and mental disorders [4]. On the other hand, people with mental disorders such as panic attacks and anxiety disorders have reported IBS-compatible gastrointestinal symptoms. Therefore, it seems that psychological disorders can be one of the main factors in the onset, continuation, or exacerbation of gastrointestinal signs and symptoms in people with this syndrome [5].

In terms of vulnerability and treatment of this disease, neither its psychological causes nor its physical causes can be relied upon. The disease is a well-known psychosocial bioactive disorder that contributes to the various stresses of life and the interaction between

individuals, environments, and physiological changes, continue, and exacerbate [6]. The quality of life of IBS patients decreases significantly, and even their quality of life has been reported to be lower than other patients with chronic medical conditions [7]. Because the etiology of this disease is not completely clear, drug therapies are not yet completely satisfactory, and a significant percentage of patients do not respond to conventional therapies. Also, the psychosocial factors of this disease have made drug treatments unsatisfactory. Therefore, psychological therapies are proposed as a lever to improve the mental health of these people [8].

Acceptance and Commitment Therapy (ACT) is one of the third wave behavioral therapies used today to treat many mental disorders. Unlike traditional cognitive-behavioral therapy approaches, ACT does not directly emphasize cognitive change, and the goal of this treatment method is to create psychological flexibility and full experience of experiences and emotions, to achieve personal values and to commit [9]. In acceptance-based therapy and commitment to changing the content of the therapist's thoughts, little emphasis is placed on acceptance of cognitions instead [10].

ACT seeks to change the socio-verbal context of clinical behavior rather than its transformation or content. This treatment is less focused on reducing symptoms and more on improving quality of life [8]. Some researchers believe that the use of this method due to its mechanisms such as acceptance, awareness-raising, desensitization, presence at the moment, observation without judgment, confrontation, and release in combination with traditional cognitive behavioral therapy techniques can increase the effectiveness of treatment while reducing the symptoms of the disease [11].

According to what was discussed and the relationship between this syndrome and stress and mental disorders, controlling and improving psychological variables can be an essential step in preventing and reducing the symptoms of IBS [12]. Therefore, it seems useful to study the effect of psychological therapies on the symptoms of this disorder. In other words, the combination of drug therapies with psychological interventions may have positive effects in reducing symptoms and improving IBS in patients and help the country's health care system save the medical costs of these patients. Therefore, this study was performed to determine the effectiveness of treatment based on acceptance and commitment to immune function and life activity limitations in patients with IBS.

## Materials and Methods

The present study was a quasi-experimental study with pre-test, post test, and follow-up, and a control group. Among the patients referred to a specialized hospital in Tabriz City, Iran, in the first half of 2019, 90 patients were selected by the available sampling method. They were in the age range of 18 to 45 years with IBS who were approved by a gastroenterologist according to Rome IV [13] criteria. The selected individuals with IBS referred by a physician were divided into the intervention and control groups regardless of personality, gender, and age differences using a random number table. Because the number of group members in group therapy varies between eight to twenty people, in this study, 15 people were considered for each group [14]. To use the table of random numbers, people were numbered from number one to ninety. Using the table of random numbers, 15 people were considered in the intervention group and 15 people in the control group.

The inclusion criteria were having been diagnosed with IBS according to Rome IV criteria by a specialist physician, having minimum literacy, providing informed consent to participate in the study, lacking other medical diseases at the same time, and being treated by a psychiatrist according to the patients' statement. The exclusion criteria included gastrointestinal bleeding, blood in the stool, fever, weight loss, anemia, and nocturnal diarrhea.

In the present study, acceptance and commitment-based therapy was performed in eight weekly sessions; each session lasted two hours for the intervention group. The control group did not receive any psychological treatment before the intervention and at the end of the study. None of the samples were excluded until the end of the study. Both groups were evaluated at the beginning and end of the intervention and follow-up (3 months) by research questionnaires. The research tools were the following questionnaires:

The activity limitations section of the quality of life questionnaire is a 36-item tool for assessing the state of health from physical and mental dimensions and consists of phrases in the form of subscales of general health, activity limitations, physical health problems, emotional health problems, pain, energy, emotions, and social activities. Its maximum score is 100, and the minimum score is 0. The score of each dimension is determined by the score of the expressions in that dimension, and higher scores indicate a better quality of life [15, 16]. To measure activity limitations, the activity

**Table 1.** Executive protocol of the sessions and goals of the treatment plan based on acceptance and commitment

Sessions Content	Therapy
First	Introduction of treatment, discussion of confidentiality, informed consent of clients to complete the treatment process, general evaluation, and familiarity with the interaction effects of irritable bowel syndrome and psychological factors
Second	Examining homework, getting acquainted with the concept of activity limitations, and discussing mental experiences
Third	Review of previous session experiences, the introduction of the concept of control as a problem to the solution, familiarity with the concept of willingness to accept, behavioral commitment
Fourth	Review of previous session experiences, behavioral task, and commitment, the introduction of cognitive fault concept, application of cognitive fault techniques
Fifth	Reviewing the assignments of the previous session, showing the separation between oneself, internal experiences and behavior, and familiarity with the concept of cognitive fusion
Sixth	Performance appraisal, application of mindfulness techniques, the contradiction between experience and mind, learning to see inner experiences as a process
Seventh	Introducing the concept of value, discovering the practical values of life, measuring performance.
Eighth	Increase focus on behavioral commitments, performance commensurate with values

limitations subscale of the psychometric Persian version of this questionnaire was used. This scale consists of 12 questions answered with a range of 1= "I have a problem", 2= "I have a little problem", and 3= "I have no problem at all". The minimum score is zero, and the maximum score is 24. Higher scores indicate more success in performing successful activities of daily living.

Fecal Calprotectin (FCP) test was performed as a pre-test (before treatment), post test (after treatment), and follow-up (three months after post test) by a single laboratory to evaluate the safety function. FCP was stored in plastic containers at -20°C for 6 hours until further analysis. FCP was measured by ELISA with a laboratory kit (Calprest, Dynex Elisa Eurospital, Trieste, Italy). FCP values are expressed in mg/kg of watery stool, and the normal value was < 50 mg/kg of feces [17]. For reliability of measurement results in the laboratory, the same measurement kit and conditions were used to measure the amount of FCP. A correlation has been shown between the amount of fecal calprotectin and the severity of mucosal inflammation and the endoscopic index of Crohn's disease severity, which was measured in the present study to measure the immune function [18].

The treatment protocol based on the ACT was performed and administered in the sessions held in the clinic of the research hospital. In the present study, acceptance and commitment-based therapy was performed in eight weekly sessions, each session lasting two hours for the intervention group.

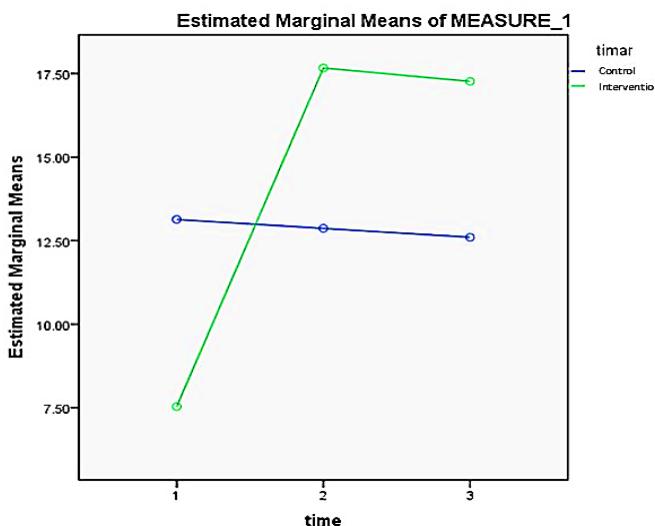
The ACT treatment program was designed based on the theoretical foundations and the main treatment

plan used in the research of Hayes et al. [19] in 8 sessions. The goals of the sessions are listed in Table 1.

To analyze the data, descriptive statistics (mean and standard deviation) and inferential statistics were used to test the hypotheses using SPSS v. 21. Analysis of data by three methods of analysis of variance with repeated measures (method 1), analysis of variance with repeated measures and considering the protein variable in the pre-test stage as a Covariate variable (method 2) and analysis of variance with repeated measures and considering the variable of activity limitations were performed in the pre-test stage as a Covariate variable (method 3). The Kolmogorov-Smirnov test was used to evaluate the normality of the data distribution. Box test was used to examine the homogeneity of covariance matrices, and Levene's homogeneity test was used to investigate the homogeneity of variance between the two groups in the post test stage. Bonferroni test was used for pairwise comparisons of the mean scores of the dependent variable (activity limitations). The effect of the confounding variable was considered the primary protein factor, a covariate variable in the analysis of covariance. P<0.05 was considered significant.

## Results

The results showed that the Mean±SD age of the intervention group was 34.53±18.38 years and the control group was 42.80±17.97 years. About 60% of the samples were women, and 40% were men. None of the samples were excluded during the study. Data were analyzed after normalization.



**Figure 1.** Activity limitations figure in three time stages: pre-test, post test, and follow-Up in the control and intervention groups

The Mean $\pm$ SD score of the activity limitations variable in the control group was  $13.13\pm4.13$  in the pre-test stage,  $12.66\pm4.06$  in the post test stage, and  $12.6\pm4.15$  in the follow-up stage (after 3 months). In the intervention group, the Mean $\pm$ SD score was  $7.53\pm4.24$  in the pre-test stage,  $17.66\pm3.41$  in the post test stage, and  $17.26\pm3.65$  in the follow-up stage. The mean and standard deviation of the dependent variable of activity limitations indicated an increase in the intervention group scores compared to the control group in the post test and follow-up stage. Based on the results, the mean scores in the control group were almost constant, but in the experimental group, the mean increased significantly. The process of changing the scores of the activity limitations variable in the pre-test evaluation to follow-up stages is presented in Figure 1.

Based on the results, the safety level of the two groups showed a significant difference before and after the intervention ( $P=0.034$ ). The results of data analysis by three methods of analysis of variance with repeated measures (method 1), analysis of variance with repeated measures and considering the calprotectin test variable in the pre-test stage as a Covariate variable (method 2), and analysis of variance with repeated measures and considering the activity limitations variable in the pre-test stage as a covariate variable (method 3) were performed. The results for each method are presented in Tables 2 and 3.

Based on the findings of Table 2 in the method of analysis of variance with repeated measures and considering the protein variable in the pre-test stage as a covari-

**Table 2.** Multivariate test results related to time in the intervention and control groups

Analysis Method	Effects	Amount of Statistics (Effect of Pillay)	F	df	Sig.
Method 1 (analysis of variance with repeated measures)	Time	0.766	44.298	2	0.0001
	Time interaction with the group	0.778	47.398	2	0.0001
Method 2 (analysis of variance with repeated measures and taking into account the calprotectin test variable)	Time	0.25	4.333	2	0.024
	Interaction of time with protein in the pre-test stage	0.115	1.684	2	0.205
	Time interaction with the group	0.794	49.966	2	0.0001
Method 3 (analysis of variance with repeated measures and taking into account the activity limitations variable)	Time	0.042	1.197	1	0.284
	Interaction of time with activity limitations in the pre-test stage	0.082	2.402	1	0.133
	Time interaction with the group	0.039	1.083	1	0.307

**Table 3.** Results of intergroup effects test in terms of protein and activity limitations

<b>Method of Analysis</b>	<b>Source of Changes</b>	<b>Sum of Squares</b>	<b>df</b>	<b>Mean of Squares</b>	<b>F</b>	<b>Sig.</b>
Method 1 (analysis of variance with repeated measures)	Intergroup	37.378	1	37.378	0.985	0.329
	Error	1062.44	28	37.944	-	-
Method 2 (analysis of variance with repeated measures and taking into account the calprotectin test variable)	Protein (Pre-test stage)	403.840	1	403.840	16.556	0.0001
	Intergroup	3.481	1	3.481	0.143	0.709
	Error	658.604	27	24.393	-	-
Method 3 (analysis of variance with repeated measures and considering the activity limitations variable)	Activity limitations (Pre-test stage)	341.982	1	341.982	21.556	0.0001
	Intergroup	655.445	1	655.445	41.314	0.0001
	Error	428.351	27	15.865	-	-

ate variable, the effect of time and the interaction of time with the group are significant, but the interaction of time with protein in the pre-test stage is not significant. In the method of analysis of variance with repeated measures, the results show that the effect of time, as well as the effect of time interaction with the group, are significant. This outcome means that the scores of the studied variable (activity limitations) have changed during the treatment period, and the means related to the three time periods have a significant difference.

Based on the information in [Table 3](#), the effect of the treatment method on the control group and the intervention group was different, and the results show that using the analysis of variance with repeated measures, the effect between groups was not significant.

In the method of analysis of variance with repeated measures and considering the activity limitations variable in the pre-test stage as a covariate variable, none of the effects of time, time interaction with the group, and timely interaction with activity limitations in the pre-test stage are significant. Still, intergroup test results show that the activity variable scores in the group that underwent commitment-based treatment were significantly different from the scores of the control group.

Since repeated measures analysis of variance was significant, a more detailed study of the differences in the simple intergroup effect steps was performed using the Bonferroni test. The results are listed in [Table 4](#) presents the difference between the means between pre-test and post test times and pre-test and follow-up, but there is no significant difference between the post test and follow-up times, which indicates the persistence of the treatment effect on the activity limitations variable.

## Discussion

The results of data analysis showed that acceptance and commitment-based therapy is associated with significant efficacy on immune function of the patients with IBS up to the follow-up stage and on activity limitations up to the post test evaluation stage. And the results of the present study are consistent with previous studies [20-23]. Considering the levels of significance, acceptance and commitment-based therapy has been more effective on the activity limitations variable than immune function, which can be explained by the fact that activities related to learning and behavior are more changeable than physiological activities of the body that among other things, we can refer to the body's immune activity. In his study, Ferreira used a summary

**Table 4.** Results for pairwise comparisons of mean scores of the dependent variable (activity limitations)

<b>Time</b>	<b>Average</b>	<b>Test</b>	<b>Mean Difference</b>	<b>Standard Error</b>	<b>Sig.*</b>
Pre-test	10.333	Pre-test,post test	4.933	0.535	0.0001
Post-test	15.267	Pre-test, follow-up	4.6	0.964	0.0001
Follow-up	14.933	Post-test, follow-up	0.333	0.356	0.99

\* Bonferroni test.

of acceptance and commitment-based therapy with a 6-month follow-up period. The results show the effect of this method on the symptoms of IBS and cognitive avoidance, and the findings of the present study are consistent with this finding [20]. In the present study, the follow-up period was three months, but patients received acceptance and commitment-based treatment in eight sessions in total. Andalib et al. achieved similar results, but their study population consisted only of soldiers referred to a military clinic and used the Rome-III version to select a sample [24].

Given that the statistical population consisted of soldiers with high stress [25], the periodicity of their study is not generalizable to other members of society. Narimani et al., in their study, showed that ACT in infertile women increases their quality of life, so the present study is consistent with the results of their research. Still, one of the limitations of their research is the lack of follow-up treatment [23]. The present study of treatment follow-up shows the stability of the effect of this treatment in the study population. Acceptance and commitment-based treatment in different groups shows its positive effect on the measured factors.

In the present study, therapeutic components such as acceptance, flexibility, and reducing the burden of negative emotions in therapeutic sessions were considered. Given that people with IBS tend to avoid their problems, these components teach the person that avoiding is not an effective solution and leads to an aggravation of the problems. The patients learn that avoidance may relieve a person of stress in the short term but worsens the problem in the long run and has a more negative impact, which is one of the primary mechanisms to improve the quality of life of these people [10]. Also, in the present study, components such as awareness of thoughts, behavior, emotions, and feelings were addressed, which play an essential role in dealing with and interpreting situations and problems [26]. ACT characteristics, such as being aware of thoughts, behaviors, emotions, and feelings, warn people against performing automatic behaviors and reactions and paying too much attention to internal experiences. This therapy encourages them to perform wise behaviors that can increase the quality of life and improve activity limitations. This treatment does not seek to change the content of thoughts but to change the approach and processes used in facing problems [27].

According to the study results, the treatment based on acceptance and commitment significantly affected the amount of calprotectin in the experimental group.

The results of the present study are consistent with the study of Wynne et al. [28]. In their study, they evaluated the effectiveness of acceptance and commitment-based therapy on cortisol and calprotectin levels in men and women with IBS. They reported that calprotectin level in the experimental group was significantly lower than in the control group [28]. Regarding this research finding, it can be stated that acceptance and commitment-based therapy is one of the effective treatments for IBS and by reducing anxiety and relieving stress. In other words, it reduces the immune response and central nervous system of the person against anxiety and exerts positive physiological effects on irritable bowel syndrome. In the present study, ACT provided training for individuals to experience their inner experiences as mere thoughts. Instead of responding to them with value of life and things that are important to them, this treatment of mindfulness and acceptance skills and the cognitive fault is used to increase psychological flexibility and helps the person to be in the moment and to communicate with inner experiences and can be a practical step in reducing psychological distress [29] because this treatment can affect the gastrointestinal function of patients with this syndrome by decreasing the activity of the central nervous system [28].

In IBS, negative thoughts and stressors may cause and worsen the symptoms of the disease. In this study, people with IBS received training such as accepting without judgment, being in the moment, and coping with unavoidable inner experiences. These factors may be effective in improving emotion regulation, reducing emotional pain, and reducing vulnerability to negative emotions [30].

In this regard, Sebastian Sánchez, in his study, showed that treatment based on acceptance and commitment has a favorable effect on the psychological state and improvement of mental health in people with IBS [8]. ACT reduces anxiety and stress in people with IBS, reducing their anxiety and possibly calming their mental health. The present study results show the positive effect of acceptance and commitment-based therapy on safety performance and quality of life with activity limitations subscale in patients with IBS but can not suggest a specific treatment compared to other methods to reduce the symptoms of the disease. The results also show that acceptance and commitment-based therapy can be used as a complementary therapy along with medical treatments to increase their effectiveness or reduce the duration of drug treatments.

One of the limitations of the present pilot study is the uniqueness of the research and the non-segregation of gender and age in group therapy. It is suggested that future studies be done by considering the above variables and with larger samples.

## Ethical Considerations

### Compliance with ethical guidelines

The present study was conducted after obtaining permission from the Ethics Committee under the Ethical Code IR.SBMU.RETECH.REC.2020.378. To observe ethics in the research, written consent was obtained from all subjects, their identity information was preserved in the study, and at the end of the study, a short-term group treatment based on acceptance and commitment therapy (4 sessions) was performed for the control group.

### Funding

The present study is extracted from the PhD dissertation of first author at the Department of Psychology, UAE Branch, Islamic Azad University, Dubai, United Arab Emirates.

### Author's contributions

Study design: Sepideh Shakernejad, Javad Khalatbari, and Majid Mahmoud Alilou; Management and teaching in meetings and data collection: Sepideh Shakernejad; Data analysis and interpretation: Sepideh Shakernejad, Javad Khalatbari, and Majid Mahmoud Alilou; Writing the original draft: Sepideh Shakernejad, Javad Khalatbari, and Majid Mahmoud Alilou; Reading and approval of the final version: Sepideh Shakernejad, Javad Khalatbari, and Majid Mahmoud Alilou.

### Conflict of interest

The authors declare that this work is an independent study with no conflict of interest with the organization or other individuals.

### Acknowledgments

We would like to express our gratitude to all participants of the present study, including the patients, medical staff, and management of Shahriar Hospital in Tabriz, who helped us in carrying out this research.

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