

# Effectiveness of Mindfulness Based Stress Reduction on Negative Emotions about Disease's Signs in Patients with Gastrointestinal Disorders

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## Abstract

**Objective:** The present study aimed to examine the effectiveness of mindfulness-based stress reduction training on negative emotions with gastrointestinal disorders.

**Method:** A quasi-experimental study was designed with pretest-posttest using control group. The study sample consisted of 30 male patients (referred to internal experts and admitted to Abbasi Hospital of Miandoab in 2016) with gastrointestinal disorders (Irritable Bowel Syndrome, peptic ulcer, and duodenal ulcer) based on diagnostic criteria (ROME-III) who were selected by purposive sampling method. The patients were randomly divided into two experimental and control groups. After performing the pretest using Depression, Anxiety, and Stress Scales (DASS), the experimental group received mindfulness-based stress reduction intervention during the eight sessions of one and a half hour, while the control group received no psychological intervention; and after the end of the sessions, the posttest was performed for both groups using the same tools. The collected data were analyzed through covariance analysis (ANCOV) by using SPSS-18 software.

**Results:** The mean scores of negative emotions rates of experimental group significantly decreased after receiving the mindfulness-based stress reduction intervention ( $P < 0.05$ ).

**Conclusion:** The findings showed that the mindfulness-based stress reduction intervention is effective and useful as supplement in addition to medications for patients with gastrointestinal disorders (Irritable Bowel Syndrome, peptic ulcer, and duodenal ulcer).

**Keywords:** mindfulness-based stress reduction, negative emotions, patients, digestion.

## Introduction

Today, most researchers who study the psychological processes reject simplistic notions of specificity and susceptibility of organs to justify physical symptoms and look to physical symptoms from an interactive standpoint. The link between psychological factors and physical symptoms has never been one-sided; any psychological state plays a role in a person's susceptibility to physical illness. But being ill, in turn, affects the individual

mentally as the person's attitude toward the disease can accelerate the healing process. On the other hand, medical researchers' attention to the role of psychological complexity on physical disorders is increasing day by day (Sarason & Sarason, 2008). However, functional gastrointestinal disorders (FGID<sup>1</sup>) is a group of common gastrointestinal diseases worldwide regardless of race and sex (Woo, Kim, Lim, Seo, and Kong Kong, 2007) that do not have a specific pathology, neither have structural or biological abnormalities (Micut, Tanasescu, & Dragos, 2001). However, considering the characteristics of these disorders,

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1- Functional Gastrointestinal Disorder

chronic and recurrent gastrointestinal symptoms are medically unjustifiable (Procelli and Soniono, 2007). On the other hand, there is a wide range of these disorders in different parts of the digestive tract from the esophagus to the rectum (Micut, Tanasescu and Dragos, 2001). Also, digestive diseases include gastric ulcer, duodenal ulcer and acid reflux into the esophagus, gall bladder, irritable bowel syndrome (IBS<sup>1</sup>), liver failure, constipation, and peptic ulcer (Harrison, 2005). In addition, these patients show gastrointestinal symptoms such as vomiting blood and the return of food from the stomach, difficulty in swallowing food, having nausea, black stools, severe pain in the abdomen, pain in the back, and weight loss (Cecil, 2004). On the other hand, management and treatment of these disorders is associated with high costs and using frequent diagnostic assessments and not very effective organic treatments (Creed, Henningsen, Fing, 2001). However, gastrointestinal disturbances and economic and psychological pressure are imposed on the society and the healthcare system (Khajeh Veluie, Vosoughinia, and Bahari, 2013). In addition, 10 percent of deaths in Iran are due to gastrointestinal diseases (Ganji, Safavi, and Naseri, 2006). Also, these disorders that comprise a major part of clinical activity of general practitioners and gastroenterologists (Crazyari, 2004; quoted by Mazaheri and Sadat Khoshuee, 2012) are often considered as treatment failures (Jones, Crowley, and Olden, 2007).

Although the pathophysiology of functional gastrointestinal disorders is not entirely clear, but the findings suggest that these disorders are multifactorial, among its causes mental disorders and personality problems can be mentioned (Preclle, Bagby, and Taylor, 2003; quoted in Mazaheri, Afshar, and Mohammadi, 2010). However, severe stress, family arguments, and depression trigger the symptoms of these disorders (Sadock and Sadock, 2008). Also, in this regard,

North (2005) showed that those with two or more medically unexplained gastrointestinal symptoms, especially when abdominal pain is one of those two symptoms, have a high rate of psychiatric disorders; however, the majority refer to a physician for their digestive symptoms (North, Alpers, and Thompson, 1996 quoted by Mazaheri and Adat Khoshuee, 2012). However, emotion regulation has an important role in the adaptation or stressing realities of life and their biological and psychological consequences. However, the best model known so far for pathology assessment, treatment, and management of these disorders is bio-psycho-social model. Also, according to this model, psychological disorders are particularly important in the pathogenesis and functional gastrointestinal disorders. The possible cause of psychological discomfort associated with these disorders is said to be functional abnormalities and inordinate in different parts of the brain-ventral axis, including the hypothalamic-pituitary-adrenal axis, sympathetic and parasympathetic nervous system, and hormonal and serotonergic system (Preclle and Sanino, 2007; Woo, 2001).

On the other hand, abdomen and brain are directly connected to each other, and this two-way connection takes place through the autonomic nervous system and hypothalamic-pituitary-adrenal axis. Note that the location of abdomen control in the central nervous system is the limbic system which also plays a major role in the excitement that is a nonverbal system to facilitate the survival, avoid the threats, social communication and learning. Limbic system generates excitement and physiological changes associated with it, and from the nervous anatomy point of view, it may be the key in mind-body interactions. However, stress is known as a threat to the balance of this organ that is involved in the creation of functional gastrointestinal disorders. The relationship between stress and digestive functions and senses shape the basis of bio-psycho-social model in the disorders (Jones, Crowley,

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1- Irritable Bowel Syndrome

and Olden, 2007). However, most existing studies consider a part of emotional dysregulation as a personality trait called alexithymia distinguished with difficulty in identifying and verbally describing the emotions. These studies provide strong evidence about the relationship between the emotional regulation deficiency and psychological problems such as depression and anxiety and physical problems such as inflammatory bowel disease, rheumatoid arthritis, chronic low back pain, and functional syndromes such as fibromyalgia or functional gastrointestinal disorders, especially IBS syndrome. Furthermore, it is argued that in functional gastrointestinal disorders, the emotion regulation deficit in the form of alexithymia and its relationship with somatization and mediation of psychological problems such as depression and anxiety are involved. The alexithymia or emotional inhibition is an important risk factor for psychosomatic disorders including gastrointestinal diseases (Mazaheri, et al., 2010).

However, new therapies such as mindfulness, derived from cognitive-behavioral treatments, are used that are an important component of the third wave of psychological models (McCarne, Solz, and Gri, 2001). Mindfulness means paying attention in a particular way, i.e. by attention and concentration where three elements are involved in: 1) be present, 2) be targeted, and 3) without judgment; this kind of attention increases awareness, transparency, clarity, and acceptance of reality (Cacran, 2009). However, mindfulness helps people to understand that negative emotions may occur, but they are not a fixed and permanent part of character. It also allows individuals to respond to events through thinking and reflection instead of answering involuntarily and without reflection (Emanuel, Updegraff, Kalmbach, and Ciesla, 2010). Also, people use meditation to foster emotional regulation skills (Linnaeus, 1993). The re-evaluation is one of emotion regulation skills; emotions are brought to the conscious level at re-evaluation and explored,

and the relationship between states and internal and external stimuli is checked again (Wscnner et al., 2002; quoted by Mohamadkhani and Heydariyan, 2014). Also, mindfulness enables the person to create a totally different relationship with internal emotions and external events, through creating real-time awareness and behavioral orientation, based on logical responsibility instead of automatic reactivity so that one can employ higher mental functions in an effective way including attention, kind attitude, curiosity, and compassion. So, mindfulness can efficiently exert control over emotional responses through inhibition of cortical limbic system (Kabat Zin, 2003, quoted by Mohammadkhani and Heydariyan, 2014). Zomorodi and Rasoulzadeh Tabatabaei (2013) evaluated the effectiveness of cognitive-behavioral therapy and mindfulness-based therapy on reducing symptoms and improving the quality of life in patients with IBS; coping skills were performed, and the results showed that mindfulness-based therapy is more effective than cognitive-behavioral therapy on reducing symptoms and improving life quality and also on adjusting coping skills of patients with IBS and maintaining the effectiveness in long-term.

Grossman, Tiefenthaler- Gilme, and Raysz Kesper (2007) showed significant improvements in pain, quality of life, coping with pain, anxiety, and depression through evaluating the effects of mindfulness-based stress reduction method on public welfare aspects, including quality of life, coping with pain, anxiety, and depression. However, the present study was evaluated the effectiveness of training mindfulness-based stress reduction method on negative emotions (depression, anxiety, and stress) of gastrointestinal patients. In addition, the innovation of the present study is related to performing mindfulness-based stress reduction intervention on patients with gastrointestinal diseases such as irritable bowel syndrome, gastric ulcer, and duodenal ulcer, based

on previous research psychological factors which have been effective on these digestive disorders. Accordingly, this study sought to determine the effectiveness of mindfulness-based stress reduction therapy on reducing the variables presented. In addition, the main research question was whether training mindfulness-based stress reduction method is effective on negative emotions?

### Materials and methods

A quasi-experimental (pretest-posttest) design with a control group was conducted. Inclusion and exclusion criteria were as follows: having a digestive disease diagnosed by a doctor, not having received any psychological treatment before entering the study, a minimum age of 25 and maximum age of 55, having literacy, informed written consent from the patients, and no history of substance abuse and psychotic drug. The participants included patients who referred to the clinic and admitted to the internal medicine ward of the Abbasi hospital in Miandoab city during 2015 due to digestive disorders. Thirty male patients were selected using purposive sampling and were randomly divided into control and experimental groups. After mindfulness training by researcher, data were analyzed via ANCOVA analysis.

#### Instruments

##### Depression, Anxiety, and Stress Scale (DASS)

This scale (Lavybund & Lavybund, 1995) is a set of three self-report scales for evaluating negative states of depression, anxiety, and stress. The use of this scale measures the severity of the core symptoms of depression, anxiety, and stress. On the other hand, to complete a questionnaire, the individual has to determine the status of a symptom during the past week. Since this scale can provide a comparison of different symptoms during the week, it can be used to evaluate treatment progress over time. The validity and reliability of DASS

was validated by Anthony (1998) applying factor analysis, showing that there are three factors of depression, anxiety, and stress. The results revealed that 68 percent of the total variance scale is determined by three factors. However, equity value of stressors, depression, and anxiety factors in the present study was found 9.07, 2.89, and 1.23, respectively; alpha coefficients for these factors were 0.97, 0.92, and 0.95, respectively. However, the reliability and validity of this inventory in Iran has been studied by Samani and Jokar (2007); the retest reliability for depression, anxiety, and stress was reported 0.80, 0.76, and 0.77, respectively, and Cronbach's Alpha for depression, anxiety, and stress was reported equal to 0.81, 0.74, and 0.78, respectively. In examining the validity of this scale, confirmatory factor analysis and principal component analysis were used. However, scoring and interpretation of subscale scores of DASS-21 contains seven questions that are calculated for the final score. Each question is rated from zero (does not apply at all in my case) to three (completely true in my case), also because DASS-21 is the short form of original 42-item scale; the final score of each subscale should be doubled, and then the severity of symptoms can be determined by referring to Table (Samani and Jokar, 2007).

##### Recognition criteria (ROMEIII)

Diagnostic criteria of ROMEIII by the board of ROMEIII is a tool for the diagnosis of functional gastrointestinal disorders as well as a research tool, presented to the scientific community after various revisions with the collaboration of many gastroenterologists in 2006 under the name of ROMEIII. This tool has a high standard and is used in Iran for detecting gastrointestinal symptoms (such as irritable bowel syndrome, gastric ulcer, and duodenal ulcer) by gastroenterologist and internal physicians (Iran Gastroenterological Association, 2015).



## Intervention

In the present study, after random assignment of patients with gastrointestinal disease into control and experimental groups, the experimental group received a group training course on mindfulness-based stress reduction according to the standard model suggested by Kabatzin (2005). It was performed in eight weeks and in an hour and a half once a week by the investigator. Each session included a brief report of the contents of past week, a review of homework and techniques; at the end of each session, the most important points of the sessions were presented to the participants as homework in the form of writing or brochures. The content of sessions is as table 1:

## Findings

The average age values of the experimental group and the control group were 38.33 years and 34.40, respectively. T-test results showed that the difference in the mean score between two groups was not significant and groups were homogenous in terms of age. Table 2 shows the distribution of variables of gender, level of education, type of digestive disease in the control and experimental groups. To examine the homogeneity of groups in terms of the mentioned variables, chi-square test was performed (Table 1). The groups were homogenous in terms of gender, level of education, and type of digestive diseases.

The descriptive statistics of negative emotions

**Table 1:** The contents of 8 group training sessions

Session	Content
<b>Session 1</b>	Pre-test, communication, and conceptualization of the problem: The first 30-minute was devoted to the implementation of the pre-test. After the pre-test, mindfulness therapy, negative emotions, and gastrointestinal symptoms were explained to the participants, and the time and place of meetings and duration of sessions were agreed between the participants and tester.
<b>Session 2</b>	After a short review of the previous session, training was given through attention practice. To do this, some raisin was given to each subject, and they were told to focus on one of them and imagine that they have never seen anything like it before. Then, they were supposed to hold one of them in their palms between their thumb and index finger (pause). Then, they had to look at it carefully (pause) and slowly rotate between the fingers (pause) and feel its texture between their fingers (pause) and closely look at it under light to see its darker dimples and folds (pause), and if, while doing so, any thoughts came to their mind like "I am doing an odd work" or "What is the purpose of this" or "I do not like this", they were not supposed to pay attention and had to turn their awareness back to the raisins (pause). Then, they had to smell the raisins, keep it under their nose, and smell it carefully with each breath, take another look (pause) and pay attention to the taste by eating raisins quietly, and pay attention to absorption, taste, biting, chewing, saliva, changing its strength, and consciously pay attention to the experience and swallow it. At the end of the meeting, the members of the group were given homework, i.e. they were asked to eat or at least employ taste awareness exercise once during eating, and if necessary, practice it with their family.
<b>Session 3</b>	Mindfulness of breathing ,review of last week assignments, sitting meditation practice, review exercises, breathing exercises, and three-minute breathing space: After learning the mindfulness of breathing, relaxation techniques such as relaxing breathing (inhale and exhale when you say words of peace) without thinking about something else and watching breathing with closed eyes were taught through the following steps: Step one: Learning comfortably and sitting quietly, perpendicular spine, and keep training and learning (10 min). Step two: breathe in and breathe out deeper than normal (15 min). Step three: paying attention to the passage of air in and out during breathing and controlling it, and attention to movements of the chest and abdomen during inhalation and exhalation (15 min). Step four: repeating calming words in mind at inhale and exhale (i.e. how much comfortably I breathe, my chest is relaxing ...) (15 min). It should be noted that in this session, 2 to 3 min rest was given to the subjects between each of the above steps to avoid sleeping. At the end of the session, the group members were given homework to practice deep breathing techniques before falling asleep with closed eyes. Talk about homework.

**Table 1:** (Cont)

<b>Session 4</b>	After a short review of the previous session, body scanning or body inspection technique was taught for stress relief, in which the following steps were taken with closed eyes: The first step was paying attention to movements of abdomen and chest when breathing (15 min); Second stage: the practice focuses on public awareness of the body and movements from all parts of the body such as, feet, legs, knees, thighs, waist, abdomen, chest, shoulders, hands, neck, face, lips, eyes, ears, and forehead (25 min); talk about homework.
<b>Session 5</b>	Stay in the present time: a review of last week assignments, 5 min "seeing or hearing" training, the practice of mindfulness of breathing and body inspection. Practice seeing and hearing: In this exercise, participants were asked to look and listen for 5 min without judgment. Searching for the sense of hearing by listening to the environmental sounds, especially the footsteps of trainer and careful attention to respiratory sounds, regardless of teaching anything else (20 min), practice of mindfulness of breathing (15 min), practice of body inspection (15 min), discussing homework, and answering participants' questions.
<b>Session 6</b>	Thoughts are not facts: review of last week assignments, discussing different views or alternative thoughts, sitting meditation (mindfulness of sounds and thoughts). Attention to mind, positive and negative thoughts, pleasant or unpleasant thoughts, allowing the entry of negative and positive thoughts to the mind and easily evacuating the mind without judgment and paying attention to them were taught. Also, "what is the best way to take care of myself" exercise and an exercise where participants determined which events in their lives are pleasant and which ones are unpleasant; in addition, how to plan life with enough pleasant events; talk about sleep hygiene and homework.
<b>Session 7</b>	License of presence: review last week assignments, breathing exercises, sitting meditation (awareness of breathing, body, voice, and mind), a description of stress and its relationship to pain, stress responses, and reactions of an individual to difficult situations and attitudes, and alternative behaviors; training 1) conscious mind walking 2) sitting meditation 3) body scan with conscious mind body movements 4) practicing three-minute breathing space (in an unpleasant event) and discussing homework and answering the questions of participants.
<b>Session 8</b>	Reception and change: review past week assignments, the practice of body inspection, summing up sessions, examining and discussing the program, scanning the entire body, and raising questions about sessions such as whether the participants achieved their expectations? Do they feel that their character has grown? Do they feel that their coping skills has increased, or do they like to continue meditation and three minutes breathing space and attention to object exercises (when eating at the present moment). After the post-test, they were asked to perform mindfulness techniques in their daily lives to improve their health.

**Table 2:** Distribution of sex, education, and the type of digestive disease in both groups, and chi-square test results

Variable	Experimental (N=15)		Control (N=15)		Statistics
	Frequency	%	Frequency	%	
Gender					$X^2= 0.067$ $P=0.715$
Male	7	46.7	8	53.3	
Female	8	53.3	7	46.7	
Level of education					$X^2= 0.067$ $P=0.713$
Under diploma	6	40	9	60	
Diploma and higher	7	46.7	8	53.3	
Type of digestive disease					$X^2=0.08$ $P=0.904$
Gastric ulcer	4	26.7	5	33.3	
Duodenal ulcer	5	33.3	5	33.3	
IBS	6	40	5	33.3	

scores regarding the pre-test of control and experimental groups are presented in Table 3.

In the pretest, mean and standard deviation scores of negative emotions for the experimental group and the control group were  $14.85 \pm 63.73$  and  $17.12 \pm 55.33$ , respectively (Table 3).

The descriptive statistics of negative emotions scores in the post-test of control and experimental groups are presented in Table 4.

Table 3 shows that in the post-tests, the mean and standard deviation scores of negative emotions for the experimental group and the control group were  $13.38 \pm 38.07$  and  $18.85 \pm 46.33$ , respectively.

However, to test the research hypotheses, analysis of covariance (ANCOVA) was used. For doing this, however, firstly some of the assumptions of covariance were evaluated.

- A) Normal distribution of scores: it is normal in both pre-test and post-test.
- B) The slope of regression: regression homogeneity hypothesis is established.
- C) The assumption of homogeneity of variance: heterogeneity of variances is established in the two groups for negative emotions variable.

Since assumptions of the analysis of covariance are established, we are allowed to use this statistical test.

After controlling for the effects of negative emotions in the pre-test, post-test differences between the groups were statistically significant at 0.05 (Table 7), i.e. mindfulness-based stress reduction training affected reducing negative emotions, depression, anxiety, and stress in patients with gastrointestinal disease with 95% confidence ( $F = 5.93$ ,  $df = 1, 27$ ;  $P < 0.05$ ).

## Discussion and conclusion

The current study evaluated the effectiveness of mindfulness-based stress reduction on negative emotions (depression, anxiety, and stress) in patients with gastrointestinal diseases (IBS, gastric ulcer, and duodenal ulcer). The experimental group received mindfulness-based stress reduction intervention and showed a significant decrease in scores of negative emotions (depression, anxiety, and stress) compared to the control group.

The results showed that there were differences in negative emotion mean scores between experimental and control groups. Also, after statistically controlling for pre-test effect, there was a significant difference between the two groups in terms of the post-test scores of negative emotions; thus, it can be concluded that reduced

**Table 3:** Descriptive statistics of negative emotions in the two groups in pretest

Variables	Group	Number	Mean	SD
Negative emotions	Experimental	15	63.73	14.85
	Control	15	55.33	17.12

**Table 4:** Descriptive statistics of negative emotions in the two groups in post-test

Variables	Group	Number	Mean	SD
Negative emotions	Experimental	15	38.07	13.38
	Control	15	46.33	18.85

**Table 5:** The results of covariance analysis of post-test of negative emotions after controlling the pretest

Source of changes	Sum of squares	Degree of freedom	Mean of squares	F	Sig	Effect size
Pretest of negative emotions	2187.62	1	2187.62	11.16	0.002	0.29
Groups	1162.42	1	1162.42	5.93	0.022	0.18
Error	5292.654	27	196.02			
Total	61418	30				

negative emotions in test scores was the effect of mindfulness-based stress reduction intervention.

Overall, the results suggest that mindfulness-based stress reduction intervention can be effective as a supplement to drug therapy for patients with gastrointestinal problems (such as irritable bowel syndrome, gastric ulcer, and duodenal ulcer).

Few studies have been conducted on the effectiveness of mindfulness-based intervention on reducing negative emotions (depression, anxiety, and stress) in patients with gastrointestinal disorders. However, the findings of this study confirmed the effectiveness of mindfulness-based stress reduction intervention on negative emotions of gastrointestinal patients, which is in line with the findings of Aghayousefi, Edraki, Zareh, and Imani (2013), who investigated mindfulness training on reduction of stress, anxiety, and depression in substance abusers. They concluded that mindfulness training is effective to reduce stress, anxiety, and depression among substance abusers. Similarly, in a meta-analysis study, Aucoin, Lalonde-Parsi, and Cooley (2014) found that mindfulness-based interventions were effective on reducing symptom severity and improving quality of life in IBS patients (Ellis, 2015).

Many research studies show that difficulties in emotion regulation (emotional deregulations) are key factors in developing many clinical behaviors and psychological problems (Gratz and Tull, 2010). Also, given psychological symptoms such as depression, anxiety, and stress as the cause of many well-known digestive disorders, many researchers conducted studies to confirm it, involving Dibajnia, Moqadasin, and Keikhari (2013) who examined the relationship between psychological disorders with irritable bowel syndrome. Their results showed that patients with IBS suffered from depression and generalized anxiety symptoms two and five times more than normal people, respectively.

Hence, cognitive change is one of the techniques in mindfulness therapy through

which people learn to observe their thoughts and feelings without judgment and take them as mental processes that pass by and do not make the reality. In this viewpoint, people in this therapeutic plan learn not to get trapped in rumination patterns (Teasdale, 2002; quoted by Mohammad Khani and Heydariyan, 2014). Therefore, gastrointestinal patients have more depression symptoms (such as negative thoughts and deep attention to these thoughts and past) compared to non-patients; the current study showed that mindfulness-based stress reduction training and exercise (thoughts are not facts and allow the entry of negative and positive thoughts to mind, without judging them and without strong focus on them) reduced depression in the experimental group.

Narimani, Arian Puran, and Abolghasemi Vahedi (2012) evaluated the effectiveness of training mindfulness-based stress reduction and emotion regulation on affection and mood of veterans of Sardasht city, revealing that mindfulness-based stress reduction training in the experimental group significantly reduced negative effect and increased positive effect, compared to the control, given that one of the psychological aspects of patients with digestive disorders (such as irritable bowel syndrome, peptic ulcer, and duodenum ulcer) includes anxiety, stress, and other disorders. For example, Yusefi (2014) compared the early maladaptive schemas and styles of emotion regulation in patients with functional gastrointestinal disorders and normal people, showing significant differences between the study groups in terms of early maladaptive schema, particularly disruption and vigilance. In mindfulness therapy and its techniques, people learn to observe and think free from judgment and criticism, with compassion towards themselves and others in practice. They learn to identify the pattern of negative thoughts by observing stressful and tragic negative thoughts before they are drawn into a vicious cycle. Thus in the long run, mindfulness



causes great changes in mood and levels of happiness and health of individuals (Williams and Penman, 2011; quoted in Mohammadkhani and Heydariyan, 2014). In this study, most patients with gastrointestinal disease (such as irritable bowel syndrome, gastric ulcer, and duodenal ulcer) complained of insomnia due to intrusive thoughts, stress, and lack of focus. Considering teaching mindfulness-based stress reduction through three-minute breathing exercises (inhale and exhale with relaxation techniques) without thinking about anything else and watching the breathing techniques, especially before the sleep, patients reported that they could sleep without taking pills. Through practicing concentration on the object (eating raisins) and applying it when eating, patients reported more comfort and pleasure.

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