

Effect of a Program Based on Acceptance and Commitment Therapy versus Processing Emotion Regulation Therapy on Illness Perception and Emotion Regulation in Patients with Irritable Bowel Syndrome

*Bothina Elsayed Said Mohamed*¹, *Nesma Ahmed Kamal*², *Safaa Abdelazem Osman Ali*³

(1) Assistant professor of psychiatric and mental health nursing, Faculty of Nursing, Zagazig University, Egypt.

(2) Lecturer of psychiatric and mental health nursing, Faculty of Nursing, Mansoura University, Egypt.

(3) Assistant professor of psychiatric and mental health nursing- Faculty of nursing, Suez Canal University, Egypt.

Abstract

Background: Numerous studies have revealed that patients with irritable bowel syndrome (IBS) have emotional dysregulation and negative illness perception. The **study aimed** to explore the effect of a program based on acceptance and commitment therapy (ACT) versus processing emotion regulation therapy (PERT) on illness perception and emotion regulation among patients with IBS. **Research design:** A randomized controlled trial design was used. **Sample:** A purposive sample of 156 patients suffering from IBS was randomized into three equal groups were chosen from the Internal Medicine Outpatient Clinic in Zagazig University Hospitals: one group received ACT, the other received PERT, and the control group not having any of the two programs. **Tools for data collection:** A self-administered questionnaire covered three parts; demographic characteristics and clinical data of patients with IBS, the Brief Illness perception questionnaire, and emotion regulation questionnaire (ERQ) were used to collect data. **Results:** There were no statistically significant differences between the studied groups in their demographic characteristics or clinical data. There was a statistically significant decrease in illness perception score post intervention compared to pre in both ACT and PERT groups by 30.79% & 50% respectively. In addition, there was a statistically significant increase in ERQ score post intervention compared to pre - intervention in both ACT and PERT groups by 53.3% and 96.67%, respectively. However, there were no change in both among the control group. Additionally, there was a strong statistically significant negative correlation between illness perception and emotion regulation scores pre- and post-interventions ($r=0.63$, $P<0.001$ and $r=0.51$, $P<0.001$ respectively). **Conclusion:** The findings demonstrate positive effects of both ACT and PERT -based programs on IBS patients' illness perception and emotion regulation. The PERT is more effective than ACT-based program. **Recommendation:** ACT and PERT could be used as adjunctive strategies in treatment programs for patients with IBS.

Keywords: Acceptance and Commitment Therapy, Emotion Regulation, Illness Perception, Irritable Bowel Syndrome.

1. Introduction

The widespread chronic gastrointestinal

illness known as irritable bowel syndrome (IBS) is characterized by stomach ache, discomfort, bloating, and changed bowel

movements such as constipation, diarrhea, or both in the absence of a specific organic or causative disease that affects patients' quality of life, psychological and social working, and time off from work (**Huang et al., 2023**).

The prevalence of IBS varies in different communities. IBS affects about 5–20% of the worldwide population (**Oka, et al, 2020**).

Anxiety, depression, stress, and diet intolerance were noticed to be significantly associated with IBS. Numerous hypotheses endeavor to description for the pathophysiology of IBS, however the etiology still unclear or obscure, maybe multifactorial. (**Jadallah et al., 2023**). Psychological factors have a role in the onset and course of IBS, especially in subjects with severe symptoms, so there is no single treatment for IBS, psychotherapy methods can improve the symptoms of IBS (**Mayer et al., 2023**). Consequently, IBS patients are in need of multipronged methods that involve a multidisciplinary team composed of doctors, nurses, nutritionists, and psychologists (**Nelkowska, 2020**). In specific, nurses play a particular and prominent role beside the patients, who also have a significant role to play in identifying behavioral patterns,

indications, feelings, deficits, and perceptions, the nurses are communicating with patient informants, sharing data, and coordinating care to provide complete support to the patients' feelings, empathetic and companionate nursing care, as well as intervention immediately (**Masclee, 2021**). Therefore, IBS patients need intensive teaching to provide them with the essential abilities and knowledge to treat this illness (**Karam et al., 2021**). It is necessary for the patients to follow definite practices in order to attain optimum control and prevent problems such as damaged quality of life; psychological suffering, malnutrition and loss of weight, improved healthcare utilization, and chronic fatigue disorder (**Algera et al., 2023**).

Moreover, the nurse assists the patients in developing healthy practices that involve nutritional adjustments, stress management approaches, pain management methods, relaxation exercises; lifestyle modifications that can relieve symptoms. Nurses also teach patients the significance of treatment adherence and self-care practices, emotion regulation, consistent physical activity, and managing sick days (**Coutts, 2019**).

Illness perceptions and emotion regulation are two cognitive and emotional processing modules that may influence results in patients with IBS (**Cruz et al., 2024**). Mostly, illness perception is the systematized cognitive picture or beliefs that patients have about their disease. These perceptions have been established to be significant determinants of emotion and behavior (**Xiong et al., 2018**). Moreover, it is one of the most important factors that can determine the occurrence of psychological issues in people with IBS (**Schwille-Kiuntke et al., 2021**). Thus, detecting effective interventions to increase illness perception among patients with IBS can provide them with diverse programs and coping strategies (**De Gucht, 2015**). ACT and PERT are effective and extensively used approaches to improve illness perception and emotion regulation in IBS patients (**Altayar et al., 2015**).

ACT emphasizes accommodating challenging ideas and feelings while resolving to take actions that align with one's morals. Its objective is to reinforce an individual's psychological bond with their beliefs, emotional state, and goals to promote adaptive coping methods and develop

psychological flexibility (**Mirsharifa et al., 2019**). On the other hand, PERT encompasses the processing and regulation of emotions to successfully manage emotional experiences. (**Sebastián Sánchez et al., 2017**).

Furthermore, ACT focuses on the significance of consciousness, acceptance, and acknowledgement of emotions and their visceral experience by attempting to directly modify the type or frequency of these inner experiences and altering how people relate to their uncooperative thoughts and emotions (**Hayes & Hofmann, 2017**). In addition, ACT encourages the individual to identify the connection between dysfunctional opinions, bad feelings, and stress, as well as how to deal with thoughts and stressful conditions through coping-based strategies (**Ruggiero et al., 2018**).

In addition, PERT assists patients in recognizing, accepting, controlling, and exploring the range of aspects associated with their feelings (**Erfan et al., 2024**). The basis of PERT is the idea that we can merely alter ourselves when we accept ourselves as we are (**Erfan et al., 2018**). The causal hypothesis of PERT is that feeling is a

fundamental and shaping factor in setting behavioral patterns and data processing and enabling one's adaptation (**Hunter, 2023**). Hence, feelings should be accepted, processed, and their meaning can be resolution which will pave the way for enhancing the level of suffering tolerance in IBS patients by enhancing positive feelings. (**Staudacher et al., 2023**).

Significance of the study

IBS affects about 5–20% of the worldwide population (**Oka et al., 2020**). Anxiety, depression, stress, and diet intolerance were noticed to be significantly associated with IBS (**El Sharawy et al., 2022**).

IBS has a high socioeconomic load and expenses that deeply affect peoples' global welfare, social working, timework, and quality of life. Numerous IBS patients suffer continuing symptoms regardless of prescribed medication and want reassurance, lifestyle advice, and different psychotherapies, so ACT and PERT can be supportive. By examining the efficiency of ACT and PERT with IBS patients, researchers can gain insights into how these interventions may help patients better cope with their symptoms and regulate their emotions. This knowledge can inform

the development of targeted interventions, improve the overall treatment outcomes for IBS patients, and inform the development of evidence-based treatment protocols for them. Consequently, it looks beneficial to study the outcome of psychological remedies on the illness perception and emotion regulation of IBS patients. In additional words, the mixture of medication using psychological interferences may have positive impact on decreasing indications, enhancing emotion regulation, and saving the medical costs of patients with IBS. Consequently, it is considered essential to conduct this study to explore the effects of ACT and PERT on illness perception and emotion regulation in patients with IBS.

The aim of the study

The present study aimed to explore the effect of program based on acceptance and commitment therapy versus processing emotion regulation on illness perception and emotion regulation in patients with IBS.

Research hypothesis

Compared with control group patients, (1) Patients with IBS receiving ACT based program will have significantly better emotion regulation (higher reappraisal and lower suppression scores); (2) Patients with IBS receiving ACT based program will have

significantly lower illness perception score;(3) Patients with IBS receiving PERT based program will have significantly better emotion regulation (higher reappraisal and lower suppression scores); (4) Patients with IBS receiving PERT based program will have significantly lower illness perception score.

2. Subjects and Method:

Study design

A randomized controlled trial design was used for this study.

Study setting

This study was conducted at the Internal Medicine Outpatient Clinic in Zagazig University Hospitals

Study subjects

The study included a purposive sample of 156 IBS patients with the following inclusion criteria: obtaining a definitive IBS diagnosis from a gastroenterologist, with a 20–60 year age range, both genders and providing written consent to enter the research. While exclusion criteria included patients who were impotent to interconnect, having a severe psychological disorder, receiving psychiatric medication, addiction to any drug, attending at concurrent enrollment

in other psychoeducational programs, missing two sessions in a row, and neglecting to turn in homework. The patients divided equally into three groups (Group I: ACT, Group II: PERT, and Group III: Control group) so each group contained 52 patients. The patients were enrolled in each group randomly using block randomization software (a sealed Envelope website) with an allocation ratio of 1:1:1(Altayar et al., 2015).

Sample size:

The sample was computed using Open Epi info according to the following (Dawson & Trapp 2004). mean illness perception score among control versus ACT group was 47.08 ± 9.63 versus 42.66 ± 4.48 , (Aghalar et al., 2020) respectively so at power of study 80% and CI 95% the sample size was calculated to be 47 in each group. After adding 10% dropout, the sample size was 52 in each group:

Tools of data collection

A self-administered Questionnaire for studied IBS patients was developed by researchers formed of three parts and was written in Arabic.

Part 1: Demographic characteristics of IBS patients (age, sex, marital status, educational level, and occupation) and Clinical data of

IBS patients (family history of disease, duration of disease, type of irritable bowel syndrome, healthy diets, exercising, commitment to taking medication and practice relaxation to deal with stress).

Part 2: The Brief Illness Perception Questionnaire (Brief IPQ) was developed by **(Broadbent et al., 2006)** to measure illness perception. It included nine items: implications, timetable, individual control, treatment management, identity, consistency, emotional portrayal, and worry about one's health. Each item is given a score between 0 and 10, and the total score can range from 0 to 80. In item 9, the causal one, patients list three things they believe to be the implicated risk in an open-ended survey designed to explore the causes of IBS. Scoring system: The aggregate of the scores for each item determines the final score. Higher scores indicate a more threatening assessment of the illness. The total score can be calculated to show the degree to which the condition is thought to be benign or threatening. The Arabic version of **(Al-Ghamdi et al., 2022)** was used in this study with good internal consistency (Cronbach's alpha = 0.78).

Part 3: Emotion Regulation Questionnaire (ERQ) was developed by **(Gross & John 2003)** to assess respondents' tendency to

regulate their emotions. It is a 10-item self-report questionnaire with four items on suppression regulation methods and six items on cognitive reappraisal. On a seven-point rating system, participants are asked to identify (from 1 = 'strongly disagree' to 7 = 'strongly agree'). Scoring system: The total scores range from 10 to 70. Higher scores indicate better emotion management. The Arabic version of **El-Azzab, Ali, and Othman (2022)** was used in this study with good internal consistency (Cronbach's alpha = 0.79 for reappraisal and 0.73 for suppression).

Validity of the study tools:

Five experts from the psychiatric academic staff of Zagazig University's faculties of medicine and nursing assessed the instruments for their comprehensiveness, simplicity of use, clarity, applicability, and usefulness. In addition, a pilot research was carried out with the help of five patients (10% of the study population), who were randomly selected to help verify that the items were understood and presented clearly. It also assessed the amount of time needed to complete the tools. Since no adjustments were required, the data from the piloted patients was used in the investigation.

Pilot study

Five patients (10% of the study population) who were randomly selected participated in a pilot study that aimed to estimate the time required to complete the scales and check that the items were clear and understood. Since there were no modifications required, the data from the piloted patients was used in the research.

Technical design:

The study included assessment, planning, implementation, and evaluation phases lasted from the beginning of July 2023 to the end of March 2024.

Assessment phase (The pre-test):

The researchers began recruiting individuals in accordance with the eligibility requirements after completing the instruments and gaining the necessary formal consents. Initially, they gave a brief explanation of the study's goal to the patients, introduced themselves, and requested their participation. Every patient was seen individually, and involvement was approved verbally. After reading and explaining the tool items to the patient, the researchers requested him or her to complete the form. The time expended to respond to all enquiries and scales ranged from 20 to 25 minutes.

Planning phase :

In light of the assessment stage's results as well as pertinent and related literature (**Black, et al. 2022; Aghalar, et al., 2020; Ghandi, et al., 2018**). The therapy sessions were created by the researchers. The aims and contents were consistent with the patients' wants in the assessment stage, which were covered in Arabic in two booklets, one for each program. Each booklet consisted of two main parts (ACT and PERT) as follows after establishing a therapeutic relationship:

ACT sessions:

First, the theoretical part of it included introducing individuals to each other and treatment contracts, providing educational information about irritable bowel syndrome, including the definition of IBS, its causes, risk factors and symptoms, complications, prevention, and guidance for those with irritable bowel syndrome. Moreover, introducing therapy technique, examining inefficient approaches for dealing with problems using numerous metaphors and 6 principles (cognitive diffusion, acceptance, being present, observing self, values clarification and committed action) .

Second, practical part about strategies used to avoid, get rid of, or "fix" unpleasant feelings, thoughts, or physical sensations and

techniques of ACT such as cognitive separation process techniques, present moment techniques, acceptance process techniques, techniques of the procedure of the self as background/self-observation, techniques of the values process, and techniques of the compliance process.

PERT sessions:

First, theoretical part of it included introducing of individuals to each other and treatment contract, providing educational information about IBS and preparing a list of patient's problems and conceptualizing the emotion-focused treatment. Moreover, recognize basic emotions, identify emotions, and express them, understanding the effect of irrational thinking on emotional turmoil, identify primary and secondary emotions, the importance of emotional regulation, basic emotional processes, and identify emotional schemas .

Second, practical part is about the strategy of positive reappraisal, emphasize acceptance of experiences, enhance awareness of emotions, some strategies for processing emotions, and explaining the ways of terminating sessions, coping with the anxiety related to termination of sessions, posttest, and saying farewell.

The control group had the same standard regular treatment modalities with the only exception of not receiving the ACT or PERT program.

Implementation phase :

Each program was implemented in the form of small group sessions. Eight sessions for each program, twice-weekly sessions for four weeks for each ACT and PERT groups not control group, every session possesses a title, objective, and content. Each session's duration varied based on how well the patients assimilated the material, which varied based on their educational background, response, availability of time, and the session's substance. The time of theoretical sessions ranged from 25 to 35 minutes, and for practical sessions, it ranged from 35 to 45 minutes. To provide education and support, interactive lectures with group discussion, role-playing, and brainstorming were used as methods of teaching, and various media, including videos, posters, and pictures, were used. Each session concluded with homework that was assessed and looked into at the start of the following one. Further, at the end of sessions, communication links, thanks, and give participants recommendations and an Arabic booklet was distributed for further remembering,

enhancement of knowledge, and understanding of acceptance and commitment therapy as well as processing emotion regulation therapy.

Evaluation phase :

The evaluation of the efficacy of ACT versus PERT was undertaken after 2 weeks of the implementation of two programs through a post-test using the same data collection tools as the pre-test during March 2024.

Ethical considerations:

Approval to conduct the study was obtained from the Research Ethics Committee of the Faculty of Nursing at Zagazig University with NO: *ID/Zu.Nur.REC #: 0039/16/5/2023* and was registered from the Pan African Clinical Trial Registry (pactr.samrc.ac.za) database with NO: *PACTR202408544265084*. Also approval from the general director of Zagazig University Hospitals was obtained prior to conducting the study. Patients were informed about the study's purpose and benefits, as well as that their participation was voluntary and that they had the right to withdraw from the study at any time for any reason. Furthermore, all data were coded to ensure the subjects' privacy, confidentiality, and anonymity. The study's implementation caused no harm to participants. This type of intervention could

not be kept a secret from participants or researchers, so the design was open-label. Though, to counteract the bias associated with open-label design, the evaluation of the study outcomes was conducted blindly.

Data analysis

The collected data was computerized and statistically analyzed using the SPSS (Statistical Package for Social Science) application, version 27.0 (IBM, 2020), quantitative data was expressed as relative percentages and frequencies. Mean and the standard deviation (mean \pm SD) were used to express quantitative data. chi-square test, F-test (ANOVA) with post hoc Tukey test, Mc-Nemar test and the paired sample t-test was used to assess the difference between variables when appreciate. To determine the correlation between variables Spearman's correlation coefficients was used. P values ≤ 0.05 denote significant findings and values < 0.001 denote highly significant findings (Kirkwood & Sterne, 2003).

3. Results:

Table 1 shows demographic and clinical characteristics of the studied groups. The mean age of them was 45.52 ± 11.0 , 46.6 ± 9.6 and 42.44 ± 6.63 in Group I, II & III

respectively. Regarding sex distribution almost half (55.8%, 59.6% & 50.0%) of cases were female in all groups. There were no statistically significant differences between the studied groups demographic characteristics and their clinical data. ($P > 0.05$).

Healthy habits pre and post intervention was revealed in Table 2. There was no statistically significant difference between the studied groups in all parameters of healthy habits pre interventions. Post- interventions, There was a highly statistical significant increase in frequency of eating healthy habits (86.5%, 88.5% versus 9.6% in Group I and II versus Group III respectively). Practicing sport (55.8%, 50% versus 19.2% in Group I and II versus Group III respectively) and adherence to treatment (96.2%, 100% versus 44.2% in Group I and II versus Group III respectively). No difference was found between Groups I and II in all parameters. Regarding difference between pre & post in each group, there was a highly statistically significant increase in frequency of eating healthy food (from 0 to 86.5% in Group I and from 5.8 to 88.5% in Group II), practicing sports (from 5.8 to 55.8% in Group I and from 7.7 to 50% in Group II) and adherence to treatment (from 28.8 to 96.2% in Group I and

from 25% 100% in Group II). There was a statistically significant increase in frequency practicing relaxation post compare to pre in Group II (32.7% to 50%) ($p = 0.04$).

Regarding, illness perception and emotion regulation scores in patient groups pre- and post -interventions there was no statistically significant difference between studied groups in illness perception pre intervention ($P > 0.05$) while post intervention, there was a highly statistically significant decrease in illness perception score in Group II compared to I & III (30.87 ± 11.17 versus 42.37 ± 10.97 and 63.65 ± 4.41 respectively) and among Group I compared to Group III. In Emotional regulation there was a highly statistically significant increase in score in Group II compared to I & III (52.19 ± 6.1 versus 46.6 ± 7.19 and 28.75 ± 8.19 respectively) and among Group I compared to Group III. Regarding difference between pre & post in each group, there was a statistically significant decrease in illness perception score post intervention compared to pre in both Group I & II by 30.79% & 50% respectively. In addition, there was a statistically significant increase in ERQ score post intervention compared to pre -intervention in both Group I and II by 53.3% and 96.67%,

respectively. (Table 3, Figure 1 &2).

Table 4 shows correlation between illness perception & emotion regulation pre interventions and different parameters among the studied patient. There was a statistical significant -ve correlation between IPQ score and occupation ($r=-0.209$, $P=0.009$), marital status ($r=-0.265$, $P=0.001$) family history ($r=-0.242$ and $P=0.002$), disease duration ($r=-0.234$, $P=0.003$) and control feeling ($r=-0.325$, $P<0.001$) where being marry, working, +ve FH, long disease duration and control feeling decrease IPQ score. Also, there was a statistically significant negative correlation between emotion regulation score and age ($r=-0.212$, $P=0.006$) and residence ($r=-0.216$, $P=0.008$) where decreased age & rural residence increase score. Finally, there was a statistical significant +ve correlation between ERQ score and occupation ($r=0.222$, $P=0.006$), marital status ($r=0.185$, $P=0.023$), disease duration ($r=0.208$, $P=0.010$) and control feeling ($r=0.397$, $P<0.001$) where being marry, working, long disease duration and control feeling increase ERQ score.

Figures 3a and b show that there was a strong, statistically significant negative correlation between the illness perception and emotion regulation scores pre- and post - intervention. ($r=0.63$, $P<0.001$ and $r=0.51$,

$P<0.001$ respectively).

Table 5 demonstrates the multivariate analyses; it identified that being married, having long disease duration and control feeling were statistically significant predictors of illness perception, (standardized beta coefficients -0.22 , -0.26 , & -0.25 , respectively). In addition, the statistically significant predictors of the emotion regulation score are age, being married, control feeling (standardized beta coefficients -0.19 , 0.18 & 0.37 respectively).

4. Discussion:

The present study was conducted to explore the effect of a program based on ACT versus PERT on illness perception and emotion regulation among IBS patients. According to the findings of the current study, there were no statistically significant variations in the demographic features of the three analyzed groups and Clinical data. This is quite important in studies testing the effect of interventions in order to avoid the effect of any confounding variables. Thus, they had similar age, gender, residence, education, marital status, and occupation distribution. In the same way, (Shahkaram et al., 2024) in Iran stated that age, gender, marital status, and there were no appreciable differences in

schooling across the research groups.

Regarding practicing healthy habits, there was a statistically significant increase in frequency of eating healthy food, practicing sport, practicing relaxation, and adhering to treatment among Groups I and II post -interventions compared to Group III. This might be explained by adopting a healthy lifestyle, which is strongly associated with reducing the severity and frequency of IBS symptoms, as well educate studied patients how to monitor IBS symptoms and nourishing status in relation to relaxation and stress. This result is in agreement with **Radziszewska et al., (2023)** who stated that consistent physical activity is an essential component in supporting IBS therapy. In the same vein, a study conducted by **Islam et al.(2021)** in Bangladesh revealed a potential link between lifestyle habits, diet, and IBS symptoms.

Before the implementation of the current study interventions, the majority of IBS patients in the two groups had negative illness perception and poor emotion regulation. However, a high score of illness perception is quite predictable given its close link with the deficiency of good emotion regulation.

Implementation of the recent study interventions led to significant enhancements

in illness perception and emotion regulation in both the ACT and PERT groups. These results indicate that both methods are effective in improving IBS patients' illness perception and emotion regulation. However, there was no statistically significant difference in illness perception and emotion regulation scores among the control group pre and post -intervention. This finding indicates the power of these approaches in relation to conventional management modalities for IBS.

After the implementation of ACT, the present study result demonstrated a statistically significant improvement in illness perception. This might be explained that ACT benefits IBS patients to live a healthy natural life and acknowledge their illness as a part of it, escalating acceptance of life's circumstances and nurturing a commitment to actions that align with one's values.

This result was consistent with the study conducted in Iran by **Afshar et al., (2016)** who stated the effectiveness of ACT and emotion regulation approaches on excitement abnormalities, anxiety sensitivity, and self-efficacy. These approaches lead to modifications in reasoning, conduct, and control of their negative feelings through efficient behaviors and the acquisition of new abilities that benefit them by reducing their

concentration on pain.

This study finding also was consistent with the outcomes of studies conducted in Iran by **Baghban Baghestan et al., (2017)** and **Aghalar et al., (2020)** who concluded that ACT could advance illness perception among research patients. In the same way, **Sebastián Sánchez et al., (2017)** in Spain, **Ferreira et al., (2018)** in Scotland, and **Wynne et al., (2019)** in the United States proved that ACT method had positive effects on the management outcomes in IBS patients.

Similarly, **Abbasi et al., (2021)** in Iran found that the ACT method was effective in improving illness perception in people with chronic illnesses. It can escalate the patient's complete awareness of current experiences and encourage them to accept undesirable individual experiences rather than avoid them. Conversely, **Karimian et al., (2021)** in Iran mentioned that ACT did not have a significant influence on progress illness perception, and decreasing non-adaptive approaches.

The current study results clarified that there was a statistically significant improvement in emotion regulation scores post-intervention compared to pre-intervention among the ACT group. This could be attributed to ACT attempts to

achieve the humanitarian aim of getting rid of disagreeable emotions by modifying them to completely experience emotions. Consequently, patients can accept their feelings and commit to making a variance.

These findings were corroborated by three studies in Iran, **Mirsharifa et al., (2019)** found at the post-test, the trial group's patients scored higher on quality of life and expressed less anxiety than the control group; and **Shahkaram et al., (2024)** suggested that using ACT is an effective psychological method for the emotional indicators of patients with IBS; and **Aghalar et al., (2020)** stated that ACT indicates an important role in the treatment of cognitive-emotional regulation. Additionally, **Shakernejad et al., (2021)** and **Romano et al., (2023)** suggested that ACT is a balancing therapy for patients with chronic disease.

Interestingly, after implementation of the PERT, the current study result indicated a statistically significant improvement in participants' illness perception. This means that a PERT-based intervention can provoke continuing, positive modifications in study variables. This might be due to the fact that the use of reasoning reappraisal was reliably augmented, provoking a significant influence on the illness perception.

In the same context, **LeBlanc et al., (2020)** in the United Kingdom revealed that a healthy emotion regulation training program fosters the capacity to detect and contemplate one's emotional state, in addition to recognizing and sufficiently expressing one's emotion.

Furthermore, after the implementation of the PERT, the present study indicated a statistically significant improvement in participants' emotion regulation. This might be due to PERT providing patients with the cognitive and behavioral procedures requisite to deal with emotion dysregulation and its destructive consequences.

This finding is in congruence with **Dorouie et al., (2017)** and **Jahangirrad et al., (2022)** in Iran, who clarified that emotion regulation abilities decreased emotion dysregulation and augmented the sorrow tolerance level significantly in IBS patients. Similarly, **Black et al., (2022)** clarified the effectiveness of psychotherapies and methods for IBS patients through improving emotion regulation skills, which lead to recovering subjective well-being, specifically for enhancing constructive affect, reducing destructive affect, and improving eudemonic wellbeing. So, PERT mitigates the effect of

mood on everyday targets and is significant for good psychological wellbeing because it adjusts how people texture and interact with the world to adjust emotions according to the situation at hand.

Findings from the present research showed a statistically significant strong negative correlation between illness perception and emotion regulation scores. This correlation means that lower illness perception scores were associated with higher emotion regulation scores. To explain such findings, it can be said that observing IBS as an enduring disorder with more severe social, emotional, and practical concerns predicts more recurrent use of emotion dysregulation methods. Hence, a mutual relationship could be demanded between illness perception and emotion regulation. In the same vein, **Xiong et al., (2018)** clarified that IBS patients' perspectives of their condition and their dysfunctional emotion regulation should be taken into account when managing them.

Finally, the demographic characteristics that had a substantial impact on the illness perception pre intervention were working, married, had positive family history of IBS and had long disease duration. In agreement with this, a study in Norway by **Michalsen et al., (2015)** stated that the

illness duration score was statistically significantly linked with illness perception. Conversely, **Aghalar et al., (2020)** stated that the disease duration score was not statistically significantly connected with illness perception.

5. Conclusion

The implemented ACT and PERT-based programs in the present study were significantly effective in improving patients' illness perception and emotion regulation among experimental groups compared to control group. The PERT is more effective than ACT-based program on IBS patients' illness perception and emotion regulation.

6. Recommendations

Based on the results of the study the nurse managers should:

- Conducting a longitudinal study to evaluate the long term efficacy of ACT versus PERT on illness perception and emotion regulation among IBS patients. This could provide valuable perceptions into the sustainability of handling effects over time.
- Integrate qualitative study approaches to search for the subjective experiences of patients undergoing ACT and PERT interventions. This could provide a profounder understanding of the instruments through which these interventions affect illness perception and emotion regulation.
- Encourage the broadcasting of ACT and PERT interventions for other patients with IBS.
- ACT and PERT could be used as adjunctive approaches in handling programs for IBS patients.
- Conducting an educational training program to teach and train staff nurses who are employed with IBS patients about the plans of ACT and PERT.
- Further research is needed on ACT and PERT based interventions for the management of IBS patients with larger sample sizes.
- Utilize mediation analysis to examine potential mechanisms underlying the effects of ACT and PERT on illness perception and emotion regulation. Recognizing mediating variables could explain how these interventions create their belongings and notify the improvement of more targeted management for IBS.

Table 1: Demographic characteristics and clinical data of the studied patients groups.

Variables		G. I (ACT) (n = 52)		G. II (PERT) (n = 52)		G. III (Control) (n = 52)		χ^2	P
		N	%	N	%	N	%		
Sex:	<i>Male</i>	23	44.2	21	40.4	26	50	0.99	0.61
	<i>Female</i>	29	55.8	31	59.6	26	50		NS
Age:	<i>20-40 y</i>	13	25	16	30.8	22	42.3	3.67	0.16
	<i>41-62 y</i>	39	75	36	69.2	30	57.7		NS
	<i>Mean ± Sd</i>	45.52±11.01		46.6±9.6		42.44±6.63		3.67	0.16
	<i>Range</i>	20-62		25-60		25-57			NS
Residence:	<i>Rural</i>	27	51.9	22	43.1	32	61.5	3.50	0.17
	<i>Urban</i>	25	48.1	29	56.9	20	38.5		NS
Education:	<i>Elementary</i>	9	17.2	6	11.5	8	15.4	7.12	0.13
	<i>Secondary</i>	24	46.2	16	30.8	26	50		
	<i>University</i>	19	36.5	30	57.7	18	34.6		
Occupation:	<i>Working</i>	37	71.2	42	80.8	39	75	1.32	0.52
	<i>Not working</i>	15	28.8	10	19.2	13	25		NS
Marital status:	<i>Married</i>	40	76.9	39	75	43	82.7	7.17	0.13
	<i>Single</i>	3	5.8	8	15.4	7	13.5		
	<i>Widow/Divorced</i>	9	17.3	5	9.6	2	3.8		
Family history:	<i>+ve</i>	28	53.8	28	53.8	28	53.8	0	1
	<i>-ve</i>	24	46.2	24	46.2	24	46.2		NS
Disease duration:	<i><1 year</i>	9	17.3	9	17.3	11	21.2	7.18	0.30
	<i>1-<5 years</i>	26	50	22	42.3	16	30.8		
	<i>5-<10 years</i>	15	28.8	13	25	17	32.7		
	<i>≥ 10 years</i>	2	3.8	8	15.4	8	15.4		

SD: Stander deviation, F: ANOVA test χ^2 : Chi square test. NS: Non significant (P > 0.05)..

Table 2: Healthy habits pre- and post -interventions among the studied patients groups.

Variables		G. I (ACT) (n = 52)		G. II (PERT) (n = 52)		G. III (Control) (n = 52)		χ^2	P	Within groups
		N	%	N	%	N	%			
Eating healthy food: (Pre)	Yes	0	0	3	5.8	5	9.6	5.01	0.08 NS	----
	No	52	100	49	94.2	47	90.4			
Eating healthy food: (Post)	Yes	45	86.5	46	88.5	5	9.6	88.89	<0.001**	0.77 NS ¹ <0.001**² <0.001**³
	No	7	13.5	6	11.5	47	90.4			
P[^]		<0.001**		<0.001**		1 NS				
Practice Sport: (Pre)	Yes	3	5.8	4	7.7	10	19.2	5.68	0.06 NS	----
	No	49	94.2	48	92.3	42	80.8			
Practice Sport: (Post)	Yes	29	55.8	26	50	10	19.2	16.51	<0.001**	0.70 NS ¹ <0.001**² <0.001**³
	No	23	44.2	26	50	42	80.8			
P[^]		<0.001**		<0.001**		1 NS				
Adherence to treatment:(Pre)	Yes	15	28.8	13	25	23	44.2	4.89	0.09 NS	----
	No	37	71.2	39	75	29	55.8			
Adherence to treatment: (Post)	Yes	50	96.2	52	100	23	44.2	63.37	<0.001**	0.15 NS ¹ <0.001**² <0.001**³
	No	2	3.8	0	0	29	55.8			
P[^]		<0.001**		<0.001**		1 NS				
Practice Relaxation: (Pre)	Yes	15	28.8	17	32.7	26	50	5.65	0.06 NS	---
	No	37	71.2	35	67.2	26	50			
Practice Relaxation:(Post)	Yes	23	44.2	26	50	26	50	0.46	0.79 NS	---
	No	29	55.8	26	50	26	50			
P[^]		0.06 NS		0.04*		1 NS				

χ^2 : Chi square test. P[^]: McNemar test NS: Non significant (P > 0.05) *: Significant (P < 0.05) **: Highly significant (P < 0.001) P1: Group I versus II P2: Group I versus III P3:Group II versus III.

Table 3: Comparison of mean illness perception and emotion regulation scores in patient groups

pre- and post -interventions.

Variables		G. I (ACT) (n = 52)	G. II (PERT) (n = 52)	G. III (Control) (n = 52)	F	P	Post hoc
Illness Perception Pre:	Mean ± SD	60.21±9.89	61.65±11.52	63.65±4.41	1.89	0.16 NS	---
	Range	29-75	22-76	56-74			
Illness Perception Post:	Mean ± SD	42.37±10.97	30.87±11.17	63.65±4.41	163.51	<0.001**	<0.001**¹ <0.001**² <0.001**³
	Range	19-61	13-56	56-74			
P\$		<0.001**	<0.001**	1 NS			
% of decrease		30.79%	50%	0%			
Emotion regulation Pre:	Mean ± SD	31.04±11.39	26.47±8.4	28.75±8.19	2.93	0.057 NS	---
	Range	14-50	10-44	12-44			
Emotion regulation Post:	Mean ± SD	46.60±7.19	52.19±6.1	28.75±8.19	149.8	<0.001**	<0.001**¹ <0.001**² <0.001**³
	Range	33-63	40-63	12-44			
P		<0.001**	<0.001**	1 NS			
% of increase		53.3%	96.67%	---			

SD: Stander deviation, F: ANOVA test, Post hoc Tukey test P\$: Paired t test

NS: Non significant (P > 0.05) *: Significant (P < 0.05) **: Highly significant (P < 0.001)

P1: Group I versus II P2: Group I versus III P3: Group II versus III.

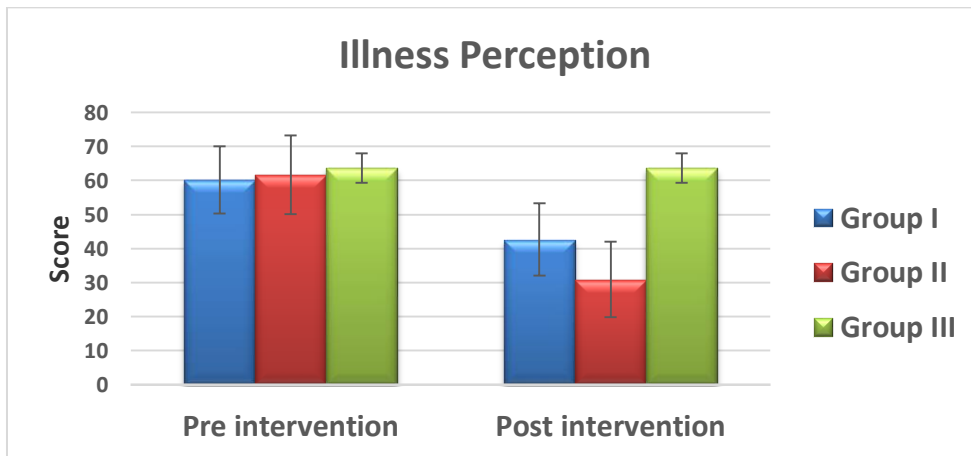


Figure 1: Percentage distribution of illness perception among the patient groups pre - and post - interventions.

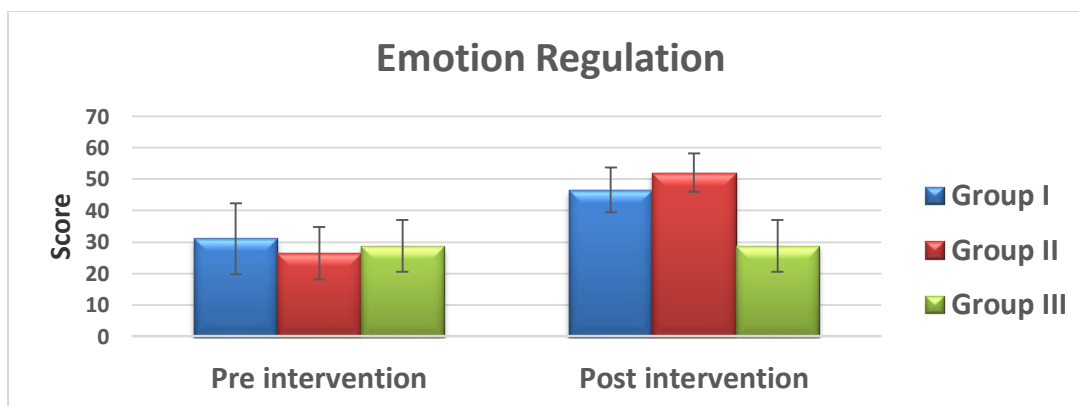


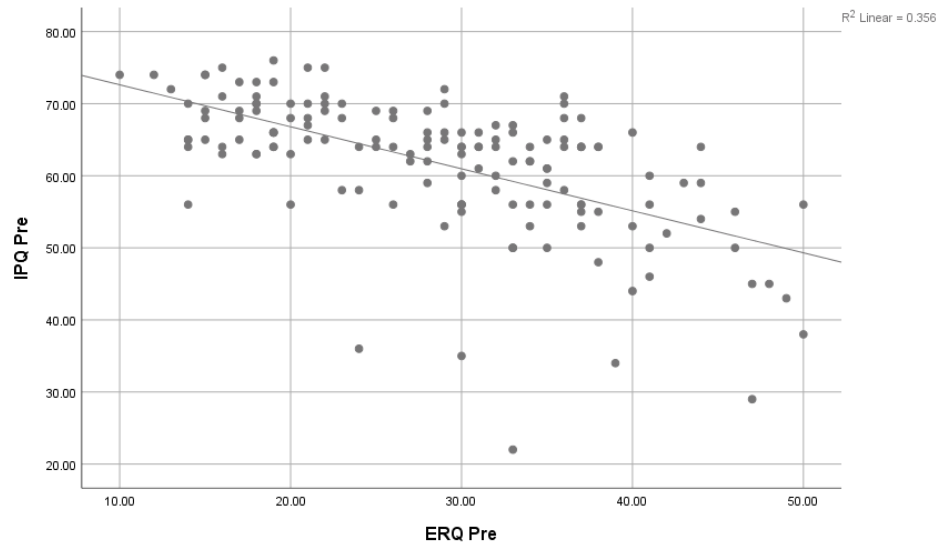
Figure 2: Percentage distribution of emotion regulation among the patient groups pre - and post - intervention.

Table 4: Correlation between illness perception & emotion regulation pre interventions and different parameters among the studied patient.

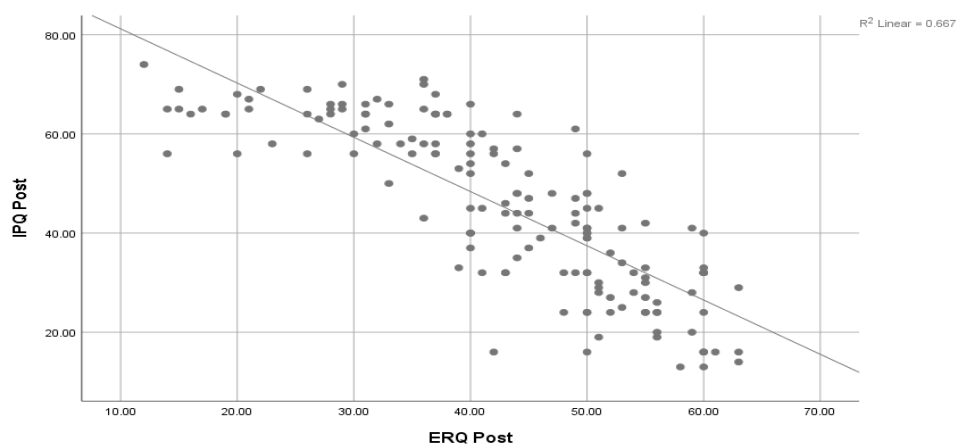
Variables		Illness perception	Emotion regulation
Age	r	0.154	-0.221
	p	0.054	0.006*
Sex	r	0.043	-0.021
	p	0.592	0.801
Residence	r	0.151	-0.216
	p	0.061	0.008*
Education	r	0.072	-0.037
	p	0.371	0.649
Occupation	r	-0.209	0.222
	p	0.009*	0.006*
Marital	r	-0.265	0.185
	p	0.001*	0.023*
Family History	r	-0.242	-0.130
	p	0.002*	0.111
Disease duration	r	-0.234	0.208
	p	0.003*	0.010*
Eat healthy food	r	0.036	-0.090
	p	0.659	0.274
Practice Sport	r	0.043	0.008
	p	0.592	0.923
Adherence to treatment:	r	-0.016	-0.099
	p	0.839	0.226

Practice Relaxation:	r	0.072	-0.034
	p	0.372	0.675
Control feeling	r	-0.325	0.397
	P	<0.001**	<0.001**

(*)Statistically significant at $p < 0.05$, (**) statistically significant at $p < 0.01$, r: Spearman’s rank correlation coefficient.



$r = 0.63, P < 0.001^{**}$



$r = 0.51, P < 0.001^{**}$

Figure 3 a & b: Correlation between illness perception and emotion regulation Pre- and Post - interventions among the studied patient.

Table 5: Linear regression analysis for significant predictors of IPQ and ERQ pre intervention among the studied cases.

Dependant	Variable	Unstandardized B	SE	Standardized coefficient Beta	95% CI	T	P
IPQ	Occupation	-1.6	1.64	-0.08	-4.84 – 1.63	0.98	0.33 NS
	Marital	-3.04	1.09	-0.22	-5.18 - -0.89	2.8	0.006*
	Family history	-1.10	1.39	-0.06	-1.64 – 3.83	0.79	0.43 NS
	Disease duration	-2.66	0.74	-0.26	-4.11 - -1.21	3.62	<0.001**
	Control feeling	-4.96	1.46	-0.25	-7.83 - -2.08	3.41	0.001*
ERQ	Age	-0.19	0.09	-0.19	-0.37 - -0.01	2.12	0.04*
	Residence	-2.64	1.37	-0.14	-5.35-0.06	1.93	0.06 NS
	Occupation	2.49	1.67	0.11	-0.82-5.79	1.49	0.14 NS
	Marital	2.54	1.09	0.18	0.39-4.70	2.33	0.02*
	Disease duration	0.68	0.93	0.07	-2.52-1.15	0.73	0.46 NS
	Control feeling	7.59	1.44	0.37	4.73-10.44	5.25	<0.001**

7. References

- Abbasi F., Manesh F.M., Naderi F., & Pour S.B. (2021).** The Effectiveness of Acceptance and Commitment Therapy on Perceived Stress and Illness Perception in Asthmatic Individuals. *Quarterly Journal of Health Psychology*, Vol. 10 (1), 7-20.
- Afshar E.K., Hatami M., Ahadi H., & Maddahi M.E. (2016).** Efficacy of Treatment Acceptance and Commitment and Emotion Regulation Strategies on Anxiety Sensitivity, Excitement Irregularities and Self-Efficacy. *International Journal of Medical Research & Health Sciences*, 5(11):294-300. ISSN 2319-5886.
- Aghalar S., Manesh F. M., Khorami N. S., & Hafezi F. (2020).** The effectiveness of acceptance-and commitment-based therapy on perception of disease in patients with irritable bowel syndrome. *International Archives of Health Sciences*, 7(3), pp. 137-142.
- Algera, J., Lövdahl, J., Sjölund, J.,**

Tornkvist, N. T., & Törnblom, H. (2023). Managing pain in irritable bowel syndrome: current perspectives and best practice. *Expert review of gastroenterology & hepatology*, 17(9), 871–881. doi.org/10.1080/17474124.2023.2242775.

Al-Ghamdi, S., Al Muaddi, A. M., Alqahtani, N. A., Alhasoon, T. Y., Basalem, A. A., & Altamimi, A. A. (2022). Validity and reliability of the Arabic version of the revised illness perception questionnaire for patients with hypertension. *Frontiers in Public Health*, 10 (3389), pp. 1–8.

Altayar O., Sharma V., Prokop L.J., Sood A., & Murad M.H. (2015). Psychological therapies in patients with irritable bowel syndrome: a systematic review and meta-analysis of randomized controlled trials. *Gastroenterol Res Pract*, 1-17. doi: 10.1155/2015/549308.

Baghban Baghestan, A., Aerab Sheibani, K., & Javedani Masrur, M. (2017). Acceptance and Commitment Based Therapy on Disease Perception and Psychological Capital in Patients with Type II Diabetes. *The Journal of Horizon Med Sci*, 23(2), 135-140. <https://doi.org/10.18869/acadpub.hms.23.2.135>.

Black C.J., Thakur E.R., Houghton L.A., Quigley E.M., Moayyedi P., & Ford A.C. (2022). Efficacy of psychological therapies for irritable bowel syndrome: systematic review and network meta-analysis. *Gut*, 69(8):1441-1451.

Broadbent E., Petrie K. J., Main J., & Weinman J. (2006). The brief illness perception questionnaire. *Journal of psychosomatic research*, 60(6), pp. 631–637 .

Coutts, A. (2019). Nursing management of irritable bowel syndrome. *Nursing Standard* 34(5):76-81. doi: 10.7748/ns.2019.e11363. PMID: 31468816.

Cruz, S., Sousa, M., & Mateus, V. (2024). Emotion Regulation and Cognitive and Social Functioning in Early Development: The Interface Between Neurophysiological and Behavioural Perspectives. *Intech. Open*, 1-19. doi: 10.5772/intechopen.1004233.

Dawson B., & Trapp R.G. (2004). Basic and clinical biostatistics, 4th ed., USA: McGraw-Hill

De Gucht V. (2015). Illness perceptions mediate the relationship between bowel symptom severity and health-related quality of life in IBS patients. *Qual Life Res*.

24(8):1845-1856. doi: 10.1007/s11136-015-0932-8.

Dorouie N., Sadeghi K., Foroughi A. A., Ahmadi S.M., & Fard A.A. (2017). The Efficacy of Emotion Regulation Skills in Patients with Irritable Bowel Syndrome: Reduction of Psychopathological Symptoms and Improvement in Quality of Life: A Case Series. *International Journal of Applied Behavioral Sciences* 4(3), 54–64. doi.org/10.22037/ijabs.v4i3.19901.

El Sharawy S.M., Amer I.F., & Elkadeem M.Z. (2022). Irritable bowel syndrome in Egyptian medical students, prevalence and associated factors: a cross-sectional study. *Pan Afr Med J.* 18(41):311. doi: 10.11604/pamj.2022.41.311.28228.

El-Azzab S. H. I., Ali Sh. M. H., and Othman B. E. M. (2022). Effectiveness of Psycho-Motivational Training on Improving Social Skills and Emotional Regulation in Patients with Schizophrenia. *EJNHS*, ISSN 2682-2563, *Egyptian Journal of Nursing & Health Sciences*, 3(2), pp. 76–101

Erfan A., Noorbala A.A., Mohammadi A., & Adibi P. (2018). The Effectiveness of Emotional Schema Therapy on the Emotional Schemas and Emotional Regulation in

Irritable Bowel Syndrome: *International Journal of Educational and Psychological Researches*; 4 (1):26-32.

Erfan, A., Aghaei, A., & Golparvar, M. (2024). Effectiveness of Group Emotional Schema Therapy on Psychological Distress, Severity and Frequency of Symptoms in Women with Irritable Bowel Syndrome. *Advanced biomedical research*, 13 (11):1-8. https://doi.org/10.4103/abr.abr_85_22.

Ferreira N.B., Gillanders D., Morris P.G., & Eugenicos M. (2018). Pilot study of acceptance and commitment therapy for irritable bowel syndrome: A preliminary analysis of treatment outcomes and processes of change. *Clinical Psychologist*, 22(2), 241-50.

Ghandi F., Sadeghi A., Bakhtyari M., Imani S., Abdi S. & Banhashem S.S. (2018). Comparing the efficacy of Mindfulness- based stress reduction therapy with emotion regulation treatment on quality of life and symptoms of irritable bowel syndrome. *Iran J Psychiatry*, 13 (3): 175-183.

Gross J.J., & John O.P. (2003). Individual differences in two emotion regulation processes: Implications for affect, relationships, and well-being.

Journal of Personality and Social Psychology, 85(2), pp. 348-362.

Hayes S.C. & Hofmann S.G. (2017). The third wave of cognitive behavioral therapy and the rise of process-based care. *World Psychiatry*. 16 (3):245- PMID: 30416258; PMCID: PMC6208646. 246. doi: 10.1002/wps.20442.

Huang K.Y., Wang F.Y., Lv M., Ma X.X., Tang X.D., & Lv L. (2023). Irritable bowel syndrome: epidemiology, overlap disorders, pathophysiology, and treatment. *World journal of gastroenterology*, 29 (26):4120-4135. doi: 10.3748/wjg.v29.i26.4120.

Hunter R. G. (2023). Editorial: Insights in emotion regulation and processing: 2022. *Frontiers in Behavioral Neuroscience*, 17, 1-2. <https://doi.org/10.3389/fnbeh.2023.1271806>

IBM corp. Released 2020. IBM SPSS statistics for Windows, Version 27.0. Armonk, NY: IBM corp

Islam S.B., Yeasmin M., & Islam N. (2021). Dietary Habit and Lifestyle Practice of Patient with Irritable Bowel Syndrome: A Case-Control Study on Bangladeshi Population. *Clin Oncol.*, 6 (1877),1-5.

Jadallah K., De Giorgio R. & Sanders D. (2023). Editorial: Irritable bowel syndrome: what is known and what is missing in daily practice. *Frontiers in Medicine (Lausanne)*, 14 (10): 1-3. doi: 10.3389/fmed.2023.12473.

Jahangirrad M., Kraskian- Mujmenari A., & Nasser- Moghaddam S. (2022). A comparative study on the effects of cognitive-behavioral therapy and emotion-focused therapy on distress tolerance in patients with irritable bowel syndrome. *International Journal of Body, Mind, and Culture*, 9(1), 29-36.

Karam M., Chouinard M.C., Poitras M.E., Couturier Y., Vedel L, Grgurevic N., & Hudon C. (2021). Nursing Care Coordination for Patients with Complex Needs in Primary Healthcare: A Scoping Review. *Int J Integr Care*, 21 (1):1-21. doi: 10.5334/ijic.5518.

Karimian Z., Haghayegh S.A., Emami-Najafi-Dehkordi S.M.,& Raisi R. (2021). The Comparison of the Effectiveness of Trans-diagnostic Treatment and Acceptance and Commitment Therapy (ACT) on Emotion Regulation and Illness Perception in Patients with Irritable Bowel Syndrome (IBS). *Res Behav Sci* 2021, 19(3), 477-488.

Kirkwood Betty R. & Jonathan A. C.

Sterne (2003). Essential medical statistics. Blackwell Science, Inc., 350 Main Street, Malden, Massachusetts 02148–5020, USA: Blackwell. ISBN 978-0-86542-871-3.

LeBlanc, S., Uzun, B., Aydemir, A., & Mohiyeddini, C. (2020). Validation of an emotion regulation-training program on mental well-being. *Psychological Reports*, 123(5), 1518-1536. doi: 10.1177/0033294119878399.

Masclee G.M., Snijkers J.T., Boersma M., Masclee A.A., & Keszthelyi D. (2021). Patient preferences of healthcare delivery in irritable bowel syndrome: a focus group study. *BMC Gastroenterol*, 23;21(1):438. doi: 10.1186/s12876-021-02030-x.

Mayer, E.A., Ryu, H.J. & Bhatt, R.R. (2023). The neurobiology of irritable bowel syndrome. *Mol Psychiatry* 28, 1451–1465. doi.org/10.1038/s41380-023-01972-w.

Michalsen, V.L., Vandvik, P.O., & Farup, P.G. (2020). Predictors of health-related quality of life in patients with irritable bowel syndrome. A cross-sectional study in Norway. *Health Qual Life Outcomes*, 13(113), 1-9. doi.org/10.1186/s12955-015-0311-8.

(BSI) Bandung Branch. *Journal Managerial*,

10,128-142.

Mirsharifa S.M., Mirzaian B., & Dousti Y. (2019). The Efficacy of Acceptance and Commitment Therapy (ACT) Matrix on Depression and Psychological Capital of the Patients with Irritable Bowel Syndrome. *Open Access Maced J. Med Sci.* 3;7(3):421-427. doi: 10.3889/oamjms.2019.076.

Nelkowska, D.D. (2020). Treating irritable bowel syndrome through an interdisciplinary approach. *Ann Gastroenterol*, 33(1):1-8. doi: 10.20524/aog.2019.0441.

Oka P., Parr H., Barberio B., Black C.J., Savarino E.V., & Ford A.C. (2020). Global prevalence of irritable bowel syndrome according to Rome III or IV criteria: a systematic review and meta-analysis. *Lancet Gastroenterol Hepatol.* 5(10):908-917. doi: 10.1016/S2468-1253(20)30217-X.

Radziszewska, M., Smarkusz-Zarzecka, J., & Ostrowska, L. (2023). Nutrition, Physical Activity and Supplementation in Irritable Bowel Syndrome. *Nutrients*, 15(16), 1-22. <https://doi.org/10.3390/nu15163662>.

Romano, D., Chesterman, S., Fuller-Tyszkiewicz, M., Evans, S., Dober, M., &

Gearry, R. (2023). Feasibility, acceptability, and preliminary efficacy of acceptance commitment therapy for adults living with inflammatory bowel disease and distress. [Inflammatory Bowel Diseases](#), 30(6), 911-921. doi: 10.1093/ibd/izad122.

Ruggiero G.M., Spada M.M., Caselli G., & Sassaroli S. (2018). A Historical and Theoretical Review of Cognitive Behavioral Therapies: From Structural Self-Knowledge to Functional Processes. *J. Ration Emot Cogn Behav Ther*, 36(4):378-403. doi: 10.1007/s10942-018-0292-8.

Schwille-Kiuntke J., Rüdlin S.L., Junne F., Enck P., Brenk-Franz K., Zipfel S., & Rieger M.A. (2021). Illness perception and health care use in individuals with irritable bowel syndrome: results from an online survey. *BMC Fam Pract*, 19;22(1):154. doi: 10.1186/s12875-021-01499-5.

Sebastián Sánchez B., Gil Roales-Nieto J., Ferreira N.B., Gil Luciano B., & Sebastián Domingo J.J. (2017). New psychological therapies for irritable bowel syndrome: mindfulness, acceptance and commitment therapy (ACT). *Rev Esp Enferm Dig*, 109 (9): 648-657. DOI: 10.17235/reed.2017.4660/2016.

Shahkaram H., Yaztappeh J.S., Sadeghi A., Kianimoghadam A.S., Soltanabadi S., Bakhtiari M., & Arani A.M., (2024). Comparing the effectiveness of trans diagnostic treatment with acceptance and commitment therapy on emotional disorders, rumination, and life satisfaction in patients with irritable bowel syndrome: a randomized clinical trial. *BMC Gastroenterology*, 24(1) 24:66. <https://doi.org/10.1186/s12876-024-03142-w>.

Shakernejad S., Khalatbari J., & Alilou M.M. (2021). The Effectiveness of Acceptance and Commitment-Based Therapy on Immune Function and Activity Limitations in Patients with Irritable Bowel Syndrome. *Journal of Holistic Nursing and Midwifery*, 31(4), 271-279. doi.org/10.32598/jhnm.31.4.2166.

Staudacher H.M., Black C.J., Teasdale S.B., Mikocka-Walus A., & Keefer L. (2023). Irritable bowel syndrome and mental health comorbidity - approach to multidisciplinary management. *Nat Rev Gastroenterol Hepatol*, 20(9):582-596. doi: 10.1038/s41575-023-00794-z.

Wynne B., McHugh L., Gao W., Keegan D., Byrne K., & Rowan C. (2019). Acceptance and commitment therapy reduces

psychological stress in patients with inflammatory bowel diseases. *Gastroenterology*, 156(4), 935-945.

Xiong N-n, Wei J., Ke M-y, Hong X., Li T., Zhu L-m, Sha Y., Jiang J., & Fischer F. (2018). Illness Perception of Patients with Functional Gastrointestinal Disorders. *Front. Psychiatry*, 9:(122). pp.1-10. doi: 10.3389/fpsyt.2018.0012.