

Effect of Health Maintenance Program Related to Ulcerative Colitis on Selected Patient's Outcomes during Remission Phase

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Abstract: Ulcerative colitis is a relapsing and remitting inflammatory bowel disease that causes a significant patient's morbidity through its effect on overall quality of life. **Purpose:** To evaluate the effect of health maintenance program related to ulcerative colitis on selected patient's outcomes during remission phase. **Setting:** Medical outpatient clinics at the National Liver Institute, Menoufia Governorate, Egypt. **Sampling:** A purposive sample of 150 adult patients had ulcerative colitis were selected and assigned alternatively into two equal groups (study and control): 75 patients for each group. **Instruments:** Four instruments were used; Structured interview questionnaire, Simple clinical colitis activity index, Fatigue severity scale and The RAND 36-item health survey. **Results:** There was a statistically significant reduction in simple clinical colitis activity index for study group from (2.27±0.24 to 2.02±0.07) post program compared to control group. The mean score of fatigue severity decreased post program from (43.57±10.29 to 24.24±7.49 in study group compared to control group from (42.78±7.36 to 43.02±7.61). Additionally, total mean score of quality of life was significantly improved post program in the study group compared to control group. Furthermore, after 3 months of implementing program there was a significant improvement in weight, BMI and total calories among the study group compared to control group. **Conclusion:** Health maintenance program had a significant positive effect on reducing mean score of ulcerative colitis symptoms and fatigue, additionally improving quality of life of patients with ulcerative colitis. **Recommendations:** A supervised health education and maintenance program that includes medication adherence, nutritional guidelines with recommended diet, and stress reduction techniques should be offered in the outpatient clinics to cope with ulcerative colitis.

Keywords: Maintenance Program, Remission Phase and Ulcerative Colitis.

*Effect of Health Maintenance Program Related to Ulcerative Colitis on Selected Patient's
Outcomes during Remission Phase*

Introduction

An inflammatory bowel disease (IBD) known as ulcerative colitis (UC) is characterized by mucosal inflammation that can start distally and spread proximally to affect the entire colon. Inflammation and ulcers of the colon and rectum are symptoms of the chronic illness ulcerative colitis (UC). The etiology encompasses interactions between the environment, immune system, gut microbiome and a genetic susceptibility to disease (Pasvol et al., 2020).

Abdominal pain, bloody diarrhea, lethargy, and fecal incontinence are the main signs of an active disease. Additionally, other symptoms include anemia, fever, and weight loss. Many times, symptoms develop gradually and can be minor to severe. Typically, symptoms flare up and disappear intermittently. Other extra-intestinal symptoms of UC include anemia, arthropathy (axial or peripheral), cutaneous (erythema nodosum or pyoderma gangrenosum), and ocular manifestations (anterior uveitis or episcleritis), in that order. The majority of these symptoms mirror the symptoms of the UC disease, with the exception of ankylosing spondylitis and peripheral polyarthritis (Shah and Itzkowitz, 2020).

All age groups may experience the disease's onset, however there is a predominate age distribution that peaks between ages 15 and 30. Relapsing and remitting is the most common way to characterize the progression of a disease. A limited minority of UC patients present with the acute, severe form of colitis known as fulminant illness, and some UC patients continue to have disease activity despite receiving full medical therapy (Lamb et al., 2019 & Fumery et al., 2018). The quality of life is impacted by UC, which also has a financial burden on healthcare system. UC can result in substantial morbidity and lower mortality. Patients with active UC are more prone to

experience anxiety and sadness, which can negatively affect their social and professional lives. Long-standing mucosal inflammation is thought to be connected to long-standing UC's higher risk of dysplasia and colorectal cancer (Regueiro et al., 2017). Additionally, complications of UC may include aberrant colon dilation (megacolon), liver, eye, joint, or joint inflammation, and colon cancer (Rubin et al., 2019).

An early and accurate diagnosis, thorough evaluation of the patient's risk factors for negative outcomes, and then the commencement of effective, safe, and tolerable drugs is all necessary for the management of UC. Reaching a sustained steroid-free remission with appropriate normal health-related quality of life (QoL), preventing morbidity, such as frequent hospitalization and colectomy, and preventing colon cancer are the ideal therapeutic goals (Eltaweel and Elbadry, 2021).

Inducing and keeping remission from UC is the major goal of treatment, with the long-term objectives of avoiding disability, colectomy, and colon cancer as secondary objectives. Remission simply means that the patient's UC symptoms go away, they feel good, and the condition does not interfere with everyday activities. The cessation of rectal bleeding and an improvement in bowel habits are to be clinical signs, and endoscopic healing is a target for remission. In addition to the ultimate objectives of treating the impact on a patient's life (health-related quality of life, disability, and faecal incontinence), preventing disease extension, surgery, permanent stoma, and dysplasia or malignancy (Le Berre et al., 2021).

Maintenance therapy is required for all patients to avoid relapse. A key objective of treatment for ulcerative colitis is the maintenance of remission throughout the rest of one's life. Remission maintenance raises productivity at work and quality of

Effect of Health Maintenance Program Related to Ulcerative Colitis on Selected Patient's Outcomes during Remission Phase

life while lowering the risk of developing colon cancer (Aslam et al., 2022). The first step in maintenance is to continue using successful medication, even when patients stop exhibiting symptoms. The second crucial step is to help patients develop long-term adherence by emphasizing the value of it to them. Simpler dose regimens provide some advantages, but the relationship between the patient and the doctor and the patient's confidence in the therapy's effectiveness are crucial. The thorough monitoring of patients for subclinical inflammation is the third element of maintenance in ulcerative colitis. This will lessen the possibility of flare-ups in the future and colorectal cancer. Clinical symptoms, biomarkers, endoscopy, and imaging are some strategies for keeping an eye on patients (Danese et al., 2022).

Dietary modifications for UC management, such as continuing a high-calorie diet or a lactose-free diet, may alleviate symptoms. Steroids, immune suppressants like azathioprine, aminosaliculates like mesalazine or sulfasalazine, biologic therapy, and other drugs are used to treat symptoms and achieve and maintain remission. If the condition is severe, does not improve with treatment, or if complications like colon cancer appear, surgery to remove the colon can be required. In most cases, the illness is treated by removing the colon and rectum (Danese et al., 2018).

It is essential for patients to engage in their care and participate in it. During the active period, clinical parameters should be reevaluated every three months. Every 6 to 12 months after symptoms have subsided, clinical reviews should be done. Colonoscopies, particularly with dye-spray chromoendoscopy, should be conducted everyone to five years to monitor for colorectal dysplasia and to investigate possible flare-ups (Loftus et al., 2020).

Nurses play a crucial role in the management of ulcerative colitis (UC) by educating the patient and introducing

community outreach programs, such as maintenance programs, which enhance quality of life by increasing knowledge about the condition and described medications, nutritional management, and stress reduction of UC patients. Through these programs, patients can learn to participate and work as a team with the provider in their own healthcare management. They also inform patients of the advantages of continuing their drug schedule even when they are feeling well. Compliance and adherence are directly linked to therapeutic success and better results (Feuerstein et al., 2020). As a result, the purpose of this study was to evaluate the effect of health maintenance program related to ulcerative colitis on selected patient's outcomes during remission phase.

Significance of the study

Ulcerative colitis is an idiopathic inflammatory disorder of the colon that causes bleeding-related superficial erosions and diffuses friability of the colonic wall. Throughout the world, it is the most prevalent type of inflammatory bowel disease. A quarter of a million doctor visits are attributed to the illness each year, and the direct medical costs associated with it are thought to be in excess of 4 billion dollar (Gisbert and Chaparro, 2019). Ulcerative is a chronic condition with no known treatment that has a negative influence on both physical and mental health. Patients who have active UC are more likely to experience sadness and anxiety, which can negatively affect their social and professional lives and increase their risk of colorectal cancer. Each patient with the condition requires ongoing care (Lee et al., 2019). In Egypt, the incidence of ulcerative colitis has grown during the past ten years (Lynch and Hsu, 2022). Patients with UC displayed a higher prevalence (59.2%) in Egypt and further, 70.5% were from North of Egypt (Elbadry et al., 2022). Previous studies of health maintenance programs

***Effect of Health Maintenance Program Related to Ulcerative Colitis on Selected Patient's
Outcomes during Remission Phase***

were conducted on ulcerative colitis for reducing signs and symptoms through medication adherence without focusing on life style modification so, staying up-to-date with life-long health care maintenance of patients with ulcerative colitis is critical especially in remission phase. Few health maintenance programs were conducted in Egypt on ulcerative colitis. For this reason, this research will be conducted to reduce patients' symptoms of ulcerative colitis, fatigue severity and to improve their quality of life.

Purpose of the study: to evaluate the effect of health maintenance program related to ulcerative colitis on selected patient's outcomes during remission phase.

Research hypotheses:

- 1) Patients who receive health maintenance program (study group) are expected to have lower mean score of ulcerative colitis symptoms than patients who don't receive (control group).
- 2) Patients who receive health maintenance program (study group) are expected to have lower level of fatigue than patients who don't receive (control group).
- 3) Patients who receive health maintenance program (study group) are expected to have higher level of quality of life than patients who don't receive (control group).

Operational definition:

- Health maintenance program means nursing intervention aimed to decrease number of relapses and relief or prevented associated symptoms of colon activity which involved medication adherence, nutritional guidelines with recommended diet and stress reduction techniques for 3 months.
- Selected patient's outcomes mean clinical symptoms of ulcerative colitis (bowel frequency at day and night, urgency of defecation, blood in the

stool, general wellbeing, and extracolonic features), fatigue and quality of life.

Method

Research design:

A quasi experimental research design (study and control) was used.

Research setting:

The study was conducted in medical outpatient clinics at the National Liver Institute, Menoufia University, Menoufia Governorate, Egypt.

Sampling

A purposive sample of 150 adult patients had ulcerative colitis were selected and divided alternatively into two equal groups (study and control group), 75 patients for each group.

The study sample was selected according to:

- a. Adult patients who are able to communicate and participate in the study.
- b. Patients with ulcerative colitis who are in the remission phase, acute phase of the disease were excluded.

Sample size estimation:

Based on review of past literature, Tamizifiar et al., 2020, who found that, quality of life was significantly improved among the study group after program. Sample was calculated at power 80% and confidence level 95%, by the following equation $N = 2SD^2 [Z_{\alpha/2} + Z_{\beta}]^2 / d^2$, where SD is the standard deviation, $Z_{\alpha/2}$ is the standard normal variate at 5% type I error, Z_{β} is the standard normal variate at power 80% it equal 0.84 and d is the effect size, the calculated sample was 75 patients per group, total sample was 150 they were randomly assigned into two groups study and control group.

*Effect of Health Maintenance Program Related to Ulcerative Colitis on Selected Patient's
Outcomes during Remission Phase*

Instruments:

Four instruments were utilized on this study:

Instrument one: Structured interview questionnaire:

It was developed by the researchers after reviewing of the related literature. It was consisted of four parts:

- **Part one:** Socio-demographic data of patients as patient's age, sex, place of residence, educational level, marital status, occupation, smoking habits and phone number.
- **Part two:** Medical data that include questions about duration of disease, presence of chronic disease, types of medication being used.
- **Part three:** Bio-physiological measurement: It was used to assess weight, height for calculating Body Mass Index [BMI (kg/m²)] determined by (CDC & National Center for Health Statistics, 2003), Four categories for the body mass index were established <18.5 that indicated underweight, from 18.5-24.9 reflected the normal body weight; 25-29.9 referred to person had overweight and from 30 or greater indicated obese.
- **Part four:** Dietary recall tool: It was developed by National Nutrient Database for Standard Reference (2000), it was used to calculate total calories intake/day after analyzing nutritional elements of three consecutive days by nutritional specialist.

Instrument two: Simple clinical colitis activity index (SCCAI):

Simple clinical colitis activity index (SCCAI) it was used to detect the severity of ulcerative colitis through objective assessment it consists of six items that were used to assess clinical symptoms of ulcerative colitis such as daytime and nighttime bowel frequency, urgency when urinating, blood in the stool, general

health, and extracolonic features (Walmsley et al., 1998).

Scoring system

Each item of SCCAI taking score as the following: bowel frequency at day scored from (0-3), bowel frequency at night (0-2), urgency of urination (0-3), blood in stool (0-3), general health (0-4) and extracolonic characteristics (0-5) are all possible results. All items of the scale was summed to give the total score of the scale that categorized as active phase of disease when (SCCAI score \geq 5) and remission phase (inactive phase) of the disease when (SCCAI score < 5) (Evertsz et al., 2013).

Instrument three: Fatigue severity scale (FSS):

The fatigue severity scale (FSS) has been developed by Krupp et al., (1989) to measure fatigue for patient with chronic illness. It consists of 9 statements, each of which is rated on a seven-point Likert scale from 1 for strongly disagreeing to 7 for strongly agreeing.

Scoring system:

The scale's overall score is calculated by adding the scores for each statement; total score is 63. And if the patient had a score of 36 or higher indicates that the patient is experiencing fatigue.

Instrument four: The RAND 36-item health survey scale:

This scale was established by Ware and Sherbourne (1992) and used to examine the health-related quality of life. It consists of eight subscales that included questionnaire to assess physical functioning 11 items (2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12), Role limitations due to physical health 4 items (13, 14, 15, 16), Role limitations due to emotional problems 3 items (17, 18, 19), Energy/fatigue 4 items (23, 27, 29, 31), Emotional wellbeing 5 items (24, 25, 26, 28, 30), Social functioning 2 items (20, 32), Pain 2

Outcomes during Remission Phase

items (21, 22), General health 5 items (1, 33, 34, 35, 36). It also includes one item that provides an indication of perceived change in health.

Scoring system:

All questions are rated on a number ranging from 2 – 6 Likert scale according to the number of questions and total score range from 0 to 100, with 100 representing the highest level of functioning.

Instruments' reliability

The test-retest reliability with Cronbach's alpha, was 0.96 and 0.98 for 24 dietary recall tool and BMI respectively (Instrument one) (Foster et al., 2019; Froseca et al., 2010) and For Simple clinical colitis activity index (SCCAI) was 0.89 (BennebroekEvertsz' et al., 2013). Studies have shown that the fatigue severity scale (FSS) has strong internal consistency, as measured by Cronbach's alpha, which was 0.95 (Rosti-Otajärvi et al., 2017). A statistically significant intraclass correlation coefficient of 0.72-0.82 (p 0.001) was found for the test-retest reliability of the quality of life measure (Zhu, Liu & Qu, 2017). In the current study Cronbach's alpha was 0.94 by test retest reliability for all the study instruments.

Instruments' validity

The construct validity of the instrument one was 0.98 and reported that dietary recall tool is sufficient for the assessment of habitual intake of energy (Foster et al., 2019) and BMI confirmed by Froseca et al., (2010) its content validity was 0.96. The construct validity of Simple clinical colitis activity index (SCCAI) (Instrument two) was 87%, $r_s = 0.66$, $\kappa = 0.66$ (Bennebroek Evertsz' et al., 2013). The construct validity of the FSS (Instrument three) was confirmed by Rosti-Otajärvi et al., (2017) and was 0.94. The evaluation of the construct validity of the RAND-36 (Instrument four) was consistent by Narváez et al., (2022).

Pilot study

To assess the clarity and applicability of the planned instruments and make the required modifications, a pilot study (10%) 15 patients not included in the studied sample.

Ethical consideration

- Formal approval was taken from the Research Ethics Committee of the Faculty of Nursing at Menoufia University (Ethics code, 864).
- An official permission was obtained from the authorities of the National liver institute after explaining the purpose of the study and method of data collection.
- Before collecting data, a written informed consent was obtained from each patient after explaining the purpose and benefits of the study. Also, they were assured that their participation was voluntary. Their confidentiality and anonymity was preserved.

Procedure:

- The administrator of the National Liver Institute was given official authority to conduct the study after receiving a letter from the dean of faculty of nursing.
- From the first of October 2022 to the end of April 2023, a seven-month period, study data were gathered.
- In medical outpatient clinics at the National Liver Institute, The researchers were attending two days/week for collecting data from 9 am to 12 Pm and conducted one-on-one interviews with patients who had consented to participate in the study and fulfilled the inclusion criteria and gave to patients a brief explanation of the study purpose.
- A purposive sample of 150 adult patients with ulcerative colitis during remission phase and fulfilled the inclusion criteria were selected, randomly and alternatively divided into two groups; study group (I) had health

Effect of Health Maintenance Program Related to Ulcerative Colitis on Selected Patient's Outcomes during Remission Phase

maintenance program in addition to conventional hospital care and control group (II) received only standard hospital care, which involved dispensing drugs and attending to any patient issues and manipulated firstly to prevent contamination of data.

- The study was conducted on four phases: Assessment, planning, implementation and evaluation phases as a following:
 - **Assessment phase:** During this phase the researchers interviewed with each patient of both groups individually to collect the base line data by using instruments two, three and four. The bio-physiological measurements was assessed by measuring weight and height in the clinic and calculate BMI and dietary recall was taken by asking the patient to recall three days of dietary intake, this took 30-45 minutes for each patient. The collection of base line data taken about two month from the first of October to the first of December.
 - **Planning phase:** The researchers prepared a colored illustrative booklet with pictures including the information about ulcerative colitis as definition, causes, signs & symptoms, medical management and a maintenance program that include medication adherence, nutritional guidelines with recommended diet and stress reduction techniques.
 - **Implementation phase:** This phase was conducted through four teaching sessions for each patient in the study group (I) only; within one month all sessions were conducted, each session lasted between 30 and 45 minutes. At the ending of each session, there was a period of 15 minutes for revision of knowledge and practice to ensure that all patients understand the explained knowledge and practice. Each session was held using lectures and discussions in the waiting room of the

outpatient clinics at the National Liver Institute, Menoufia governorate.

- The researchers follow the patients for more commitment with the program through telephone contact every week and asked about 24hrs recall for dietary compliance and give opportunity to ask any question.

Health maintenance program content

A colored illustrative booklet with pictures was distributed for study group to explain the following information through these sessions.

- **First session** contain information related to ulcerative colitis as definition, signs & symptoms, types, causes, risk factors and complications.
- **Second session** contain revision on previous session and explained the management and life style modification to cope with the disease and prevention of reactive phase it include medication adherence as described, frequency, side effects and its management.
- **Third session** discuss with patients dietary guideline for ulcerative colitis based on patient-centered IBD-related organizations (Brown et al., 2011 & UCSF Health, 2023) which include eating a well-balanced diet, eating four to six times daily, eating at a healthy temperature, drinking enough fluids, avoiding spicy foods, cutting back on margarine and other saturated fats, polyunsaturated fatty acids, omega-6 fatty acids, and high-fat diets, as well as cutting back on simple carbohydrates. Inform patients about foods low in lactose such as cream cheese, butter, frankfurters, and creamy salad dressings, instant potato mixes, stuffing mixes, noodles, and rice as well as foods higher in lactose such as milk, cream, ice cream, and cheeses aged less than 90 days. In addition, increase good-quality protein and eliminate dairy products in the presence of lactose intolerance. In addition, limit intake of probiotic yoghurt, salmon, and canned

Outcomes during Remission Phase

goods while avoiding coffee, tea, fast food, prepared meals, and chocolate.

- **Fourth session** the researchers demonstrated and re-demonstrated procedures related to stress management as relaxation techniques as: rhythmic breathing: maintain a quiet environment, place patient in comfortable position by elevating legs with the knees bent (relaxing the leg, back, and abdominal muscles), instruct patient to close eyes and to breathe in and out slowly; say rhythmically, breath in, 2, 3, 4; breathe out, 2, 3, 4. Once rhythmic breathing is established, instruct patient to imagine peaceful and pleasant place; look around, listen to the sounds, feel the air, notice the smells. Once the patients is breathing slowly and comfortably, have them tensely and then relax a set of muscle groups in a prescribed order, such that each area feels relaxed. Instruct the patient to use a progressive relaxation technique by first tensing and then releasing their calves, knees, and so on (Progressive relaxation) (Cooper and Gosnell, 2015).

Evaluation phase:

After three months of follow up, the studied patients were interviewed at medical outpatient clinics at National Liver Institute, Menoufia Governorate, Egypt by using the same data collection instruments were used to collect data from both groups taken about one month to evaluate effect of health maintenance program related to ulcerative colitis on selected patient's outcomes during remission phase

Statistical analysis

Statistical Package of Social Science (SPSS) version 20 (SPSS, Inc., Chicago, Illinois, USA) was used on an IBM personal computer for data collection, tabulation, and statistical analysis. The means, standard deviations (SD), and ranges of the quantitative data were reported, and the numbers and percentages

of the qualitative data. Shapiro Data normality was assessed using the Wilk test. Chi-squared test was employed to compare qualitative data. For data with a normal distribution, the paired sample t-test was employed, while the Mann-Whitney test was used to compare quantitative variables with non-normal distributions. Wilcoxon test was applied to connected, non-normally distributed quantitative variables. For correlation between quantitative variables, Spearman's correlation was utilized. P value 0.05 was chosen as the significance level.

Results

Table (1) illustrates socio-demographic characteristics of the studied groups. The mean age was $(33.7 \pm 8.86$ and $34.1 \pm 8.15)$ for study and control group respectively. There was no significant difference between the study and control group regarding their socio demographic data ($P > 0.05$).

Table (2) demonstrates medical data of the studied groups. There was no statistical significant difference between the study and control group regarding their medical data ($P > 0.05$).

Table (3) shows comparison between study and control groups regarding total mean score of simple clinical colitis activity index (SCCAI) pre and post program. There was a statistical significant reduction in simple clinical colitis activity index for study group from 2.27 ± 0.24 pre-program to 2.02 ± 0.07 post program ($p < 0.001^{**}$) compared to control group no statistical significant difference was obtained ($p < 0.740$).

Table (4) presents comparison between study and control groups regarding total mean score of fatigue severity pre and post program. There was no statistical significant difference between the study and control group regarding fatigue severity score before program (P value > 0.05). After applying the program there was a significant decrease in severity of fatigue mean score among the study group

*Effect of Health Maintenance Program Related to Ulcerative Colitis on Selected Patient's
Outcomes during Remission Phase*

43.57±10.29 versus 24.24±7.49 (P value <0.001), while there was no statistical significant difference in the control group.

Figure (1) shows comparison between study and control groups regarding percent of fatigue severity pre and post program. There was no statistical significant difference between the study and the control group concerning percent of fatigue severity pre- program (P >0.05). While at post program there was a significant decrease percent of fatigue severity 16% for the study group versus 80% for the control group (P <0.001).

Table (5) reveals comparison between study and control groups regarding quality of life pre and post program. There was no statistical significant difference between the study and control group regarding quality of life before program (P >0.05). After applying the program there was significant increase in majority of all domain of quality of life and total quality of life increase from 39.2±30.5 to 119.9±30.5 among the study group, compared to control group there was significant decrease in all domains of quality of life and total quality of life from 40.9±30.5 pre program to 34.5±21.3 post program.

Table (6) illustrates comparison between study and control groups regarding their nutritional status pre and post program.

There was no statistical significant difference between the study and control group regarding their weight, BMI and total calories pre -program (P >0.05). After applying the program there was significant increase in weight, BMI and total calories among the study group (P <0.001).

Table (7) illustrates comparison between study and control groups according to classification of BMI pre and post intervention. There was no statistical significant difference regarding the classification of BMI before program while after applying the program there was a significant improvement in weight among the study group (P <0.001).

Table (8) shows correlation between total mean score of simple clinical colitis activity index (SCCAI) and fatigue severity and quality of life post program among the study group. There was significant positive correlation between simple clinical colitis activity index (SCCAI) and Fatigue Severity score post program among the study group (r = 0.416 , P <0.001). Also, there was significant negative correlation between simple clinical colitis activity index (SCCAI) and Quality of life post program among the study group (r = - 0.569 P< 0.001).

Effect of Health Maintenance Program Related to Ulcerative Colitis on Selected Patient's Outcomes during Remission Phase

Table (1): Distribution of socio demographic characteristics of the studied groups (n=150)

Socio demographic characteristics	Study group (N= 75)		Control group (N=75)		X2	P value
	No.	%	No.	%		
Age / years - Mean ±SD	33.7±8.86		34.1±8.15		t=0.49	0.618
Sex - Male - Female	39 36	52.0 48.0	31 44	41.3 58.7	1.71	0.190
Residence - Rural - Urban	19 56	25.3 74.7	25 50	33.3 66.7	1.15	0.282
Marital status - Single - Married - Widowed - Divorced	15 56 2 2	20.0 74.6 2.7 2.7	7 58 6 4	9.4 77.3 8.0 5.3	5.61	0.132
Educational level - Illiterate - Read and write - Primary - Secondary - High education	4 11 32 21 7	5.3 14.7 42.7 28.0 9.30	6 21 33 10 5	8.0 28.0 44.0 13.3 6.70	7.77	0.100
Occupation - Manual work - Administrative work - Not work	20 9 46	26.7 12.0 61.3	25 7 43	33.3 9.3 57.4	0.907	0.636
Smoking - Yes - No	19 56	25.3 74.7	12 63	16.0 84.0	1.99	0.158

Table (2): Distribution of medical data of the studied groups (n=150)

Medical data	Study group (N= 75)		Control group (N=75)		X2	P value
	No.	%	No.	%		
Duration of the disease - Less than 1 year - 1 – 3 years - 4 – 6 years - 7 – 9 years - > 9 years	2 4 31 26 12	2.70 5.30 41.3 34.7 16.0	8 2 33 21 11	10.6 2.70 44.0 28.0 14.7	4.90	0.297
Other diseases - Yes - No	33 42	44.0 56.0	35 40	46.7 53.3	0.11	0.742
Medication - Anti-inflammatory - Immunosuppressive - Anti-diarrheal - Iron complement - Biological therapy	35 30 0 0 10	46.7 40.0 0.00 0.00 13.3	27 35 0 0 13	36.0 46.7 0.00 0.00 17.3	1.81	0.404

Effect of Health Maintenance Program Related to Ulcerative Colitis on Selected Patient's Outcomes during Remission Phase

Table (3): Comparison between study and control groups regarding total mean score of simple clinical colitis activity index (SCCAI) pre and post program

Studied variables			Study Group	Control group	Independent sample t test	P value
			Mean ±SD	Mean ±SD		
Simple Clinical Colitis Activity Index (SCCAI)	Pre program		2.27±0.24	2.29±0.21	0.632	0.529
	Post program		2.02±0.07	2.28±0.21	9.581	<0.001*
Paired sample t test			8.784	1.265		
P value			<0.001*	0.210		

* Significant

Table (4): Comparison between study and control groups regarding total mean score of fatigue severity pre and post program

Studied variables			Study Group	Control group	Mann Whitney test	P value
			Mean ±SD	Mean ±SD		
Fatigue Severity score	Pre program		43.57±10.29	42.78±7.36	0.841	0.398
	Post program		24.24±7.49	43.02±7.61	7.44	<0.001*
Wilcoxon test			7.52	0.948		
P value			<0.001*	0.343		

* Significant

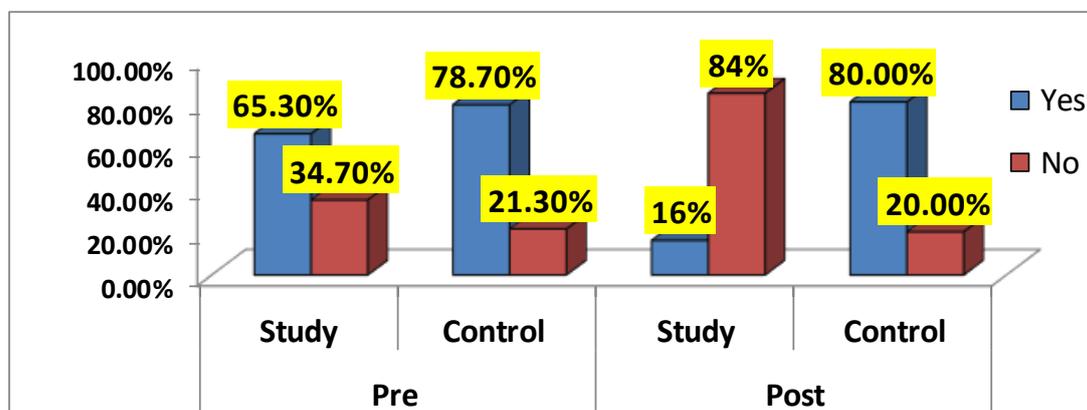


Figure 1 : Comparison between study and control groups regarding fatigue severity percent of pre and post program.

Effect of Health Maintenance Program Related to Ulcerative Colitis on Selected Patient's Outcomes during Remission Phase

Table (5): Comparison between study and control groups regarding quality of life pre and post program

Studied variables	Study Group		Control group		P1	P2	P3	P4
	Pre program	Post program	Pre program	Post program				
	Mean ±SD	Mean ±SD	Mean ±SD	Mean ±SD				
Physical functioning	25.6±16.5	69.3±12.5	28.6±15.1	23.9±12.9	0.250	0.001*	0.001*	0.001*
Physical limitation	42.6±24.6	77.1±17.3	42.3±17.3	27.7±26.2	0.354	0.001*	0.001*	0.001*
Emotional limitation	40.4±20.6	70.6±18.6	40.1±17.3	26.9±23.4	0.365	0.001*	0.001*	0.001*
Energy /vitality	30.03±16.8	61.0±31.0	31.5±16.8	24.8±14.0	0.315	0.001*	0.001*	0.001*
Emotional well being	51.4±10.3	73.0±8.46	51.6±11.1	45.7±10.2	0.816	0.001*	0.001*	0.001*
Social functioning	42.3±14.4	68.4±9.83	43.7±14.0	39.1±12.3	0.554	0.001*	0.001*	0.001*
Bodily Pain	38.1±24.3	71.5±13.7	32.3±22.9	30.1±19.9	0.106	0.001*	0.001*	0.121
General health	35.7±14.0	68.4±8.67	34.5±13.9	28.6±10.5	0.597	0.001*	0.001*	0.001*
Total	39.2±25.3	119.9±30.5	40.9±30.5	34.5±21.3	0.801	0.001*	0.001*	0.040*

* Significant Mann Whitney test for P1, P2 Wilcoxon test for P3, P4

P1: Comparison between study and control pre- program **P2:** Comparison between study and control post program **P3:** Comparison between pre and post program in study group **P4:** Comparison between pre and post program in control group

Table (6): Comparison between study and control groups regarding their nutritional status pre and post program

Nutritional status		Study group	Control group	Mann Whitney test	P value
		Mean ±SD	Mean ±SD		
Weight	Pre program	64.8±6.30	63.4±7.40	1.60	0.108
	Post program	70.6±5.00	61.3±7.73	7.92	<0.001*
Wilcoxon test		4.87	7.10		
P value		<0.001*	<0.001*		
BMI	Pre program	25.5±2.18	24.6±2.87	1.18	0.241
	Post program	27.4±1.57	23.8±2.98	10.09	<0.001*
Wilcoxon test		6.76	7.01		
P value		<0.001*	<0.001*		
Total calories	Pre program	1724.4±109.5	1698.4±110.5	1.85	0.064
	Post program	1734.6±111.4	1663.7±161.7	3.27	0.001*
Wilcoxon test		3.74	1.26		
P value		<0.001*	0.207		

* Significant

Table (7): Comparison between study and control groups according to classification of BMI pre and post intervention.

Classification of body mass index	Study group (N= 75)		Control group (N=75)		X2	P value
	%	No.	%	No.		
Pre program						
- Underweight	20	26.70	18	24.00	2.048	0.359
- Normal	25	33.30	26	34.70		
- Overweight	30	40.00	31	41.30		
Post program						
- Underweight	4	5.30	19	25.30	27.850	<0.001*
- Normal	43	57.30	27	36.00		
- Overweight	28	37.40	29	38.70		

* Significant

Effect of Health Maintenance Program Related to Ulcerative Colitis on Selected Patient's Outcomes during Remission Phase

Table (8): Correlation between total mean score of simple clinical colitis activity index (SCCAI) and fatigue severity and quality of life post program among the study group (N= 75):

Studied variables	Simple Clinical Colitis Activity Index (SCCAI)	
	R	P value
Fatigue severity score	0.489	0.001*
Quality of life	-0.521	0.004*

* Significant

r: Spearman's correlation

Discussion:

The quality of life (QoL) of people with ulcerative colitis is greatly impacted because it is a chronic inflammatory disease. Treatments that elicit and maintain remission can have advantages beyond strict clinical targets since the disease impacts various facets of quality of life, which includes numerous domains. QoL can be recovered and brought back to normal or close to normal levels with proper management of ulcerative colitis (Armuzzi and Liguori, 2021). Therefore, the purpose of the study was to evaluate maintenance program effectiveness on ulcerative colitis patient's outcomes during remission phase.

Regarding simple clinical colitis activity, the present study revealed that there was a significant decrease among the study group post intervention compared to control group. This result was consistent with Mohamed et al., (2022) who reported that the majority of study sample improved in clinical symptoms and the severities of symptoms decreased after intervention compared to pre intervention with statistically significant difference.

Also, this finding was in agreement with Limketkai et al., (2019) they found that participants in study group achieved significant clinical remission compared to control group participants. This could be related to effective program instructions were explained in simple way to encourage patients to follow proper diet and stress

management to feel better without symptoms.

Concerning fatigue severity, the current study showed that there was a significant decrease in severity of fatigue among the study group post intervention contrary to control group. This finding was congruent with Lamers et al., (2022) who reported that the impact of the disease on daily life reduced and fatigue decreased in the study participants post intervention compared to baseline with statistically significant difference. This was due to decreased clinical symptoms which had positive effect on reducing fatigue as well as improvement in nutritional status and also, relaxation technique.

For quality of life, the present study illustrated that there was a significant increase in quality of life among the study group post program compared with control group. This result was in accordance with Tamizifar and Arab, (2020) who reported that implementing of dietary modification for ulcerative colitis patients' able to improve certain indicators of quality of life, as well as mental health, physical functioning, vitality and general health status. Also, the same results was in the same line with Amaral et al., (2020) who reported that the practice of physical activity was effective for better quality of life, this mean that any aspect of lifestyle modification such as diet or physical activity is essential in improving quality of life. Also, there are some aspects of quality of life,

including bodily pain, physical and emotional limitation were increased in study group compared to the control group the same result was obtained by Amaral et al., (2020). In my point of view increasing these aspects were due to scoring system of the scale “its score of 2 (response to no symptom or no limitation) on quality of life scale” which increased its total post intervention.

Moreover, this finding was in agreement with Fritsch et al., (2021) they found that there were significant improvements in clinical symptoms and Quality of Life (QoL) in study participants post intervention compared with baseline. This could be related to patient commitment to program instructions to feel better and to be able to perform daily living activities without complications.

In contrast this result was contradicted with Langhorst et al., (2020) who reported that both groups showed improvement in Health Related Quality of Life (HRQoL) from baseline to post-treatment at week 12. The sum score showed no significant group difference. This could be related to their study group didn't compliance enough with training sessions for more effect.

As regard to weight, BMI and total calories, the current study revealed that there was a significant increase in weight, BMI and total calories among the study group after intervention compared to control group. This finding was adhering to Shafiee et al., (2020) who found that the patients in the clinically inactive state (no symptoms) had more weight gain after 6 months and the dietary intake was higher than the active state (with severe symptoms). The researchers explained that increasing of weight and BMI was due to decreasing symptoms e.g. fatigue, diarrhea and bleeding which improve their dietary

intake and so on improving their weight than before.

Moreover, this result was congruent with Tamizifar and Arab, (2020) who found that the sample in the study group consumed greater amounts of total calories contrasted to the control group with statistically significant difference. This indicated relatively good compliance of the study group to the program instructions to improve their health.

For correlation between simple clinical colitis activity, fatigue severity and quality of life on post program, the present study clarified that there was a significant positive correlation between simple clinical colitis activity and fatigue severity among the study group. This result was in accordance with Regueiro et al., (2023) who found that there was a significant positive relationship between clinical disease activity and fatigue. A higher percentage of patients with UC and fatigue had moderate/severe clinical disease activity. The mean level of pain and sleep disturbance was higher in patients with UC and fatigue. This was due to clinical symptoms including pain had a bad effect on patient health status causing fatigue and burden on his life.

The current study illustrated that there was a significant negative correlation between simple clinical colitis activity and quality of life on post program among the study group. This finding aligned with Panés et al., (2017) whom reported that there was linear relationship between patient HRQoL and SCCAI. A lower SCCAI score corresponded to a higher HRQoL index value.

Moreover, this result was consistent with Armuzzi et al., (2020) they found that there was a significant negative association between disease activity and quality of life; patients with active

disease reported significantly lower quality of life scores.

Additionally, this finding was agreed with Fu et al., (2020) they reported that Disease Activity Indices (DAI) were significantly negatively correlated with HRQoL. This was due to complete control of all symptoms could achieve optimal improvement in patient HRQoL.

Conclusion

Health maintenance program had a significant positive effect on reducing mean score of ulcerative colitis symptoms and fatigue, additionally improving quality of life of patients with ulcerative colitis.

Recommendations

- A supervised health education and maintenance program that includes medication adherence, nutritional guidelines & recommended diet, and stress reduction techniques should be offered in the outpatient clinics to cope with ulcerative colitis.
- A colorful, illustrative, simple and accessible booklet containing knowledge about ulcerative colitis and methods of compliance with the disease for patients should be available at outpatient clinic at National Liver Institute.
- Similar study should be conducted elsewhere on a larger sample size to generalize the results.
- Similar study should be conducted elsewhere for assessing the effect of the program on other clinical outcomes among patients having ulcerative colitis

References

Amaral, M. T. P. D., Scudeller, T. T., Santos, M. C. F. D., Guidorzi, N. V., & Zanetti, M. R. D. (2020). Impact of an exercise protocol on sexuality and

quality of life of climacteric women. *ABCS health sci*, 1-6.

Armuzzi, A., & Liguori, G. (2021). Quality of life in patients with moderate to severe ulcerative colitis and the impact of treatment: a narrative review. *Digestive and Liver Disease*, 53(7), 803-808.

Aslam N, Lo SW, Sikafi R, Barnes T, Segal J, Smith PJ, Limdi JK. A review of the therapeutic management of ulcerative colitis. *Therapeutic Advances in Gastroenterology*. 2022 Nov;15:17562848221138160.

Bennebroek Evertsz', F., Nieuwkerk, P. T., Stokkers, P. C., Ponsioen, C. Y., Bockting, C. L., Sanderman, R., & Sprangers, M. A. (2013). The patient simple clinical colitis activity index (P-SCCAI) can detect ulcerative colitis (UC) disease activity in remission: a comparison of the P-SCCAI with clinician-based SCCAI and biological markers. *Journal of Crohn's and Colitis*, 7(11), 890-900.

Brown, A. C., Rampertab, S. D., & Mullin, G. E. (2011). Existing dietary guidelines for Crohn's disease and ulcerative colitis. *Expert review of gastroenterology & hepatology*, 5(3), 411-425.

Center of Disease Control and Prevention (CDC) & National Center for Health Statistics. (2003). Prevalence of Overweight among Children and Adolescents: United States. Retrieved at: December 29, 2003. Available on: <https://www.cdc.gov/obesity/data/childhood.html>

Cooper, K., & Gosnell, K. (2014). *Foundations of nursing-E-book*.

- Elsevier Health Sciences, 7th ed., Canada, Mosby, 456, 510.
- Danese, S., Banerjee, R., Cummings, J. F., Dotan, I., Kotze, P. G., Leong, R. W. L., ... & Yamamoto-Furusho, J. K. (2018). Consensus recommendations for patient-centered therapy in mild-to-moderate ulcerative colitis: the i Support Therapy-Access to Rapid Treatment (iSTART) approach. *Intest Res*, 16(4), 522-528.
- Danese, S., Vermeire, S., Zhou, W., Pangan, A. L., Siffledeen, J., Greenbloom, S., ... & Panaccione, R. (2022). Upadacitinib as induction and maintenance therapy for moderately to severely active ulcerative colitis: results from three phase 3, multicentre, double-blind, randomised trials. *The lancet*, 399(10341), 2113-2128.
- Elbadry, M., Nour, M. O., Hussien, M., Ghoneem, E. A., Medhat, M. A., Shehab, H., ... & El Kassas, M. (2022). Clinico-epidemiological characteristics of patients with inflammatory bowel disease in Egypt: A nationwide multicenter study. *Frontiers in Medicine*, 9, 867293.
- Moussa, A., Eltaweel, N. H., & Elbadry, M. (2021). Epidemiological and Clinical Characteristics of Ulcerative Colitis in Upper Egypt: A single center study. *Afro-Egyptian Journal of Infectious and Endemic Diseases*, 11(4), 397-403.
- Bennebroek Evertsz', F., Nieuwkerk, P. T., Stokkers, P. C., Ponsioen, C. Y., Bockting, C. L., Sanderman, R., & Sprangers, M. A. (2013). The patient simple clinical colitis activity index (P-SCCAI) can detect ulcerative colitis (UC) disease activity in remission: a comparison of the P-SCCAI with clinician-based SCCAI and biological markers. *Journal of Crohn's and Colitis*, 7(11), 890-900.
- Feuerstein, J. D., Isaacs, K. L., Schneider, Y., Siddique, S. M., Falck-Ytter, Y., Singh, S.,... & Terdiman, J. (2020). AGA clinical practice guidelines on the management of moderate to severe ulcerative colitis. *Gastroenterology*, 158(5), 1450-1461.
- Fonseca, H., Silva, A. M., Matos, M. G., Esteves, I., Costa, P., Guerra, A., & Gomes-Pedro, J. (2010). Validity of BMI based on self-reported weight and height in adolescents. *Acta Paediatrica*, 99(1), 83-88.
- Foster, E., Lee, C., Imamura, F., Hollidge, S. E., Westgate, K. L., Venables, M. C., ... & Brage, S. (2019). Validity and reliability of an online self-report 24-h dietary recall method (Intake24): a doubly labelled water study and repeated-measures analysis. *Journal of nutritional science*, 8, e29.
- Fritsch, J., Garces, L., Quintero, M. A., Pignac-Kobinger, J., Santander, A. M., Fernández, I., ... & Abreu, M. T. (2021). Low-fat, high-fiber diet reduces markers of inflammation and dysbiosis and improves quality of life in patients with ulcerative colitis. *Clinical Gastroenterology and Hepatology*, 19(6), 1189-1199.
- Fu, H., Kaminga, A. C., Peng, Y., Feng, T., Wang, T., Wu, X., & Yang, T. (2020). Associations between disease activity, social

Outcomes during Remission Phase

- support and health-related quality of life in patients with inflammatory bowel diseases: the mediating role of psychological symptoms. *BMC gastroenterology*, 20, 1-8.
- Fumery, M., Singh, S., Dulai, P. S., Gower-Rousseau, C., Peyrin-Biroulet, L., & Sandborn, W. J. (2018). Natural history of adult ulcerative colitis in population-based cohorts: a systematic review. *Clinical Gastroenterology and Hepatology*, 16(3), 343-356.
- Gisbert, J. P., & Chaparro, M. (2019). Clinical usefulness of proteomics in inflammatory bowel disease: a comprehensive review. *Journal of Crohn's and Colitis*, 13(3), 374-384.
- UCSF Health, (2023). Nutrition Tips for Inflammatory Bowel Disease. Available at: <https://www.ucsfhealth.org/education/nutrition-tips-for-inflammatory-bowel-disease>
- Krupp, L. B., LaRocca, N. G., Muir-Nash, J., & Steinberg, A. D. (1989). The fatigue severity scale: application to patients with multiple sclerosis and systemic lupus erythematosus. *Archives of neurology*, 46(10), 1121-1123.
- Lamb, C. A., Kennedy, N. A., Raine, T., Hendy, P. A., Smith, P. J., Limdi, J. K., ... & IBD Guidelines eDelphi Consensus Group. (2019). British Society of Gastroenterology consensus guidelines on the management of inflammatory bowel disease in adults. *Gut*, 68(Suppl 3), s1-s106.
- Lamers, C. R., De Roos, N. M., Heerink, H. H., Van de Worp-Kalter, L. A., & Witteman, B. J. (2022). Lower impact of disease on daily life and less fatigue in patients with inflammatory bowel disease following a lifestyle intervention. *Inflammatory Bowel Diseases*, 28(12), 1791-1799.
- Langhorst, J., Schöls, M., Cinar, Z., Eilert, R., Kofink, K., Paul, A., ... & Koch, A. K. (2020). Comprehensive lifestyle-modification in patients with ulcerative colitis—a randomized controlled trial. *Journal of clinical medicine*, 9(10), 3087.
- Le Berre, C., Peyrin-Biroulet, L., Sandborn, W. J., Colombel, J. F., Rubin, D., Chowers, Y., ... & Danese, S. (2021). Selecting end points for disease-modification trials in inflammatory bowel disease: the SPIRIT consensus from the IOIBD. *Gastroenterology*, 160(5), 1452-1460.
- Lee, J. S., Kim, E. S., & Moon, W. (2019). Chronological review of endoscopic indices in inflammatory bowel disease. *Clinical endoscopy*, 52(2), 129-136.
- Limketkai, B. N., Iheozor-Ejiofor, Z., Gjuladin-Hellon, T., Parian, A., Matarese, L. E., Bracewell, K., ... & Mullin, G. E. (2019). Dietary interventions for induction and maintenance of remission in inflammatory bowel disease. *Cochrane Database of Systematic Reviews*, (2).
- Lins-Kusterer, L., Aguiar, I., Santos-Lins, L. S., Lins-Rocha, M., Aguiar, C. V. N., Menezes, M. S., ... & Brites, C. (2022). Validation of the RAND 36-Item Health Survey questionnaire in Brazil. *Arquivos de Gastroenterologia*, 59, 193-197.

- Loftus Jr, E. V., Feagan, B. G., Panaccione, R., Colombel, J. F., Sandborn, W. J., Sands, B. E., ... & Vermeire, S. (2020). Long-term safety of vedolizumab for inflammatory bowel disease. *Alimentary pharmacology & therapeutics*, 52(8), 1353-1365.
- Lynch, W. D., & Hsu, R. (2022). *Ulcerative Colitis*, in *StatPearls*. Treasure Island (FL): StatPearls Publishing; 2023 Jan-. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK459282/>
- Mohamed, N. A. E., Ahmed, A. L., & Elhadary, S. M. (2022). Effect of Life Style Modification on the health status for Patients with Ulcerative Colitis. *Egyptian Journal of Nursing and Health Sciences*, 3(2), 45-67.
- Narváez, M., Lins-Kusterer, L., Valdelamar-Jiménez, J., & Brites, C. (2022). Quality of life and antiretroviral therapy adherence: A cross-sectional study in Colombia. *AIDS Research and Human Retroviruses*, 38(8), 660-669.
- Institute of Medicine (US) Panel on Micronutrients. *Dietary Reference Intakes for Vitamin A, Vitamin K, Arsenic, Boron, Chromium, Copper, Iodine, Iron, Manganese, Molybdenum, Nickel, Silicon, Vanadium, and Zinc*. Washington (DC): National Academies Press (US); 2001. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK222310/> doi: [10.17226/10026](https://doi.org/10.17226/10026)
- Panés, J., Domènech, E., Aguas Peris, M., Nos, P., Riestra, S., Juliá de Páramo, B., ... & Marín-Jiménez, I. (2017). Association between disease activity and quality of life in ulcerative colitis: Results from the CRONICA-UC study. *Journal of Gastroenterology and Hepatology*, 32(11), 1818-1824.
- Pasvol, T. J., Horsfall, L., Bloom, S., Segal, A. W., Sabin, C., Field, N., & Rait, G. (2020). Incidence and prevalence of inflammatory bowel disease in UK primary care: a population-based cohort study. *BMJ open*, 10(7), e036584.
- Regueiro, M., Greer, J. B., & Szigethy, E. (2017). Etiology and treatment of pain and psychosocial issues in patients with inflammatory bowel diseases. *Gastroenterology*, 152(2), 430-439.
- Regueiro, M., Hunter, T., Lukanova, R., Shan, M., Wild, R., Knight, H., ... & Naegeli, A. N. (2023). Burden of fatigue among patients with ulcerative colitis and crohn's disease: results from a global survey of patients and gastroenterologists. *Advances in Therapy*, 40(2), 474-488.
- Rosti-Otajärvi, E., Hämäläinen, P., Wiksten, A., Hakkarainen, T., & Ruutiainen, J. (2017). Validity and reliability of the Fatigue Severity Scale in Finnish multiple sclerosis patients. *Brain and behavior*, 7(7), e00743.
- Rubin, D. T., Ananthakrishnan, A. N., Siegel, C. A., Sauer, B. G., & Long, M. D. (2019). ACG clinical guideline: ulcerative colitis in adults. *Official journal of the American College of Gastroenterology| ACG*, 114(3), 384-413.
- Shafiee, N. H., Manaf, Z. A., Mokhtar, N. M., & Ali, R. A. R. (2020).

Effect of Health Maintenance Program Related to Ulcerative Colitis on Selected Patient's Outcomes during Remission Phase

- An assessment of dietary intake, food avoidance and food beliefs in patients with ulcerative colitis of different disease status. *Intestinal research*, 18(4), 447-458.
- Shah, S. C., & Itzkowitz, S. H. (2020). Reappraising risk factors for inflammatory bowel disease-associated neoplasia: implications for colonoscopic surveillance in IBD. *Journal of Crohn's and Colitis*, 14(8), 1172-1177.
- Tamizifar, B., & Arab, A. (2020). Effects of comprehensive dietary advice on the physical and mental health of patients with ulcerative colitis during the remission phase: a parallel randomized controlled clinical trial. *International Journal of Food Properties*, 23(1), 1834-1844.
- Walmsley, R. S., Ayres, R. C. S., Pounder, R. E., & Allan, R. N. (1998). A simple clinical colitis activity index. *Gut*, 43(1), 29-32.
- Ware Jr, J. E., & Sherbourne, C. D. (1992). The MOS 36-item short-form health survey (SF-36): I. Conceptual framework and item selection. *Medical care*, 473-483.
- Zhu, Y., Liu, J., & Qu, B. (2017). Psychometric properties of the Chinese version of the WHOQOL-HIV BREF to assess quality of life among people living with HIV/AIDS: a cross-sectional study. *BMJ open*, 7(8), e016382.