Effectiveness of an Instructional program on Patients with Ulcerative Colitis Adherence for Medication and Diet to Prevent Colorectal Cancer: Case and Control Study

فاعلية البرنامج التعليمي على مرضى التهاب القولون التقرحي حول الالتزام بالأدوية والنظام الغذائي للوقاية من سرطان القولون والمستقيم: دراسة الحالة والشاهد

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المستخلص

الهدف: تهدف الدراسة الى معرفة فاعلية البرنامج التعليمي في التزام المريض بالأدوية والنظام الغذائي ولمعرفة العلاقة بين فاعلية برنامج التعليم وبياناتهم الديموغرافية مثل العمر والجنس والحالة الاجتماعية ومستوى التعليم والمهنة والدخل الشهري ومحل الإقامة.

المنهجية: أجريت دراسة شبه تجريبية على المرضى الذي حضر إلى مستشفى أمراض الجهاز الهضمي والكبد التعليمي من اذار ٢٠٢١ إلى ايلول ٢٠٢١. أخذ العينات غير الاحتمالية بما في ذلك ٥٠ مريضًا لدراسة مجموعة دراسة الحالة و٣٠ مريضًا للمجموعة الضابطة. يتكون الاستبيان من ٣ أجزاء، الجزء الأول تضمن البيانات الديموغرافية والذي يتكون من ٨ عناصر. يتكون الجزء الثاني من ١٢ عنصرًا متعلقًا بالتزام المريض بالأدوية. ويتناول الجزء الثالث التزام المريض بنظام غذائي يتضمن ١٤ مادة.

النتائج: أظهرت نتائج الدراسة الحالية أن ٤٥.٧٪ من مجموعة الحالات كانوا يلتزمون بنظام غذائي صحي في الاختبار المسبق بينما تحسنت نسبة التزامهم إلى ٦٢.٤٪ في الاختبار البعدي، وكان التزامهم بالأدوية ٤٢.٢٪ في الاختبار المسبق، وتحسن التزامهم بالأدوية. إلى ٧٨.٣٪ في الاختبار البعدي.

الاستنتاجات: ان البرنامج التعليمي لتحسين الالتزام بالأدوية والغذاء الصحي كان فعالا على المرضى في مجموعة الدراسة.

التوصيات: زيادة الوعي الصحي يعد مهما لدى المريض تجاه مضاعفات التهاب القولون التقرحي وإنشاء وحدات إعادة تأهيل في المستشفيات لإرشاد المريض إلى أهمية الالتزام بنظام غذائي وعلاج متوازن.

الكلمات المفتاحية: معارف، التهاب القولون التقرحي ، إجراءات الوقاية ، سرطان القولون والمستقيم ، المضاعفات.

Abstract

Objectives: The study aims to assess the effectiveness of the educational program on patient's medication and diet adherence and to identify the relationship between the effectiveness of the education program and their demographic characteristics such as: age, gender, marital status, level of education, occupation, monthly income and residence location.

Methodology: A quasi-experimental design study was performed on patient who attended to Gastroenterology and Hepatology Teaching Hospital from March 2021 to September 2021. A non-probability sampling included of 50 patients for study group and 30 patients for control group. The questionnaire consists of 3 parts, part one is the socio-demographic, which consist of 8 items. Part two consist of 12 items related to patient medications adherence. Part three encounter patients diet adherence, which include 14 items.

Results: A 45.7% of the study group were adhered to a healthy diet at pretest while the percent of their adherence was improved to 62.4% at posttest, their adherence for medication was 42.2% at pretest, and their adherence for medication was improved to 78.3% at posttest.

Conclusion: The educational program to enhance medications and diet adherence among patients with ulcerative colitis was effective on study group.

Recommendations: An increasing patient's health awareness is important toward ulcerative colitis complication and establishing rehabilitation units in hospitals for guiding the patient about the importance of adhering to a balanced diet and treatment.

Keywords: Knowledge, Ulcerative colitis, Prevention measures, Colorectal cancer, Complication

INTRODUCTION

Diet has a big role to decrease risk of colorectal cancer. According to a recent meta-analysis of 21 prospective studies, it demonstrated that a higher intake of dietary fiber protects against CRC arising from the observation of significantly lower rates of CRC. Patient compliance can be defined as the extent to which a patient's behavior conforms to the instructions given by health practitioners.

Inflammatory bowel disease (IBD) which includes Crohn's disease (CD) and ulcerative colitis (UC) are chronic, relapsing inflammatory diseases that affect the digestive system and affect individuals worldwide. The prevalence of CD and UC is highest in Western Europe and North America. However, a high incidence is observed globally, particularly in newly industrialized regions such as Asia, where IBD was previously considered rare [(1)].

Ulcerative colitis is one of the two main forms of chronic inflammatory bowel disease, which is a relapsing inflammation of the mucous membrane of the colon with variable extension from the rectum towards the cecum. The inflammation in ulcerative colitis is limited to the mucosal layer. It usually begins in the rectum where there is usually the highest inflammatory activity [(2)].

Ulcerative colitis is a chronic inflammatory condition of the large intestine associated with proctitis but often extends proximal to additional areas of the colon. Absence of rectal involvement is observed in less than 5% of adult patients with IBS at diagnosis but can be seen in up to a third of pediatric colitis cases [(3)].

Although the incidence of UC has stabilized in developed nations, at the turn of the twenty-first century, it has already increased in many newly industrialized countries within South America, Asia, Africa and the Middle East. Although the prevalence remains low in these countries, it is expected to rise due to the increasing number of new diagnoses UC [(4)]. Demonstrated that 15% of all deaths in UC patients are a result of colorectal cancer. Confirmed risk factors for colorectal cancer help with individual risk stratification of patients and include disease severity and duration and primary sclerosing cholangitis as well as a positive family history [(5)].

Ulcerative colitis causes significant morbidity and a low mortality rate described. Patients with active disease are more likely to have psychopathic conditions of anxiety and depression and are more likely to have poor social interactions or career advancement. Long-term nephritis is also associated with a specific risk of dysplasia and colorectal cancer, which is thought to be associated with unexamined long-term inflammation [(6)]. CRC associated with IBD is thought to begin as no dysplasia and progress to nonspecific dysplasia, low-grade dysplasia, and high-grade dysplasia, and finally to invasive adenocarcinoma, although some CRC can be elevated without transition from dysplasia [(7)].

Study concluded that adherence in ulcerative colitis: an overview. Adherence to treatment is a key factor in the treatment of chronic diseases such as UC, and most of the data in the literature refer to adherence to medication, and standard of care to induce and maintain remission in UC [(8)].

Significant changes in dietary intake over the past decades have been associated with an increased incidence of UC. The relationship between diet and the development of UC has been indicated. Two recent meta-analysis studies showed that soft drink consumption and sucrose intake were associated with a 69% and 10% increased risk of UC (UC) and an increased risk of complications, respectively [9].

Study found that age- and sex-specific risk of colorectal cancer in incident ulcerative colitis during the first 10 years after diagnosis: a nationwide population-based study, conducted on 30,546 and 88,829 individuals with and without UC, respectively, were enrolled. CRC developed in 85 (0.27%) among UC, and 340 (0.38%) among individuals without UC, respectively. Inflammatory bowel diseases have affected 1.5 and 2.2 million people in the United States and Europe, respectively, followed by thousands of individuals worldwide. Epidemiological studies have shown the development of this disease in developed countries. Although epidemiological data is scarce in developing countries, a similar trend appears to exist in these regions leading to the global emergence of UC [10].

In this regard, a high annual incidence of this disease has been reported during the last two decades. In Asia and the Eastern Mediterranean, an incidence rate of 6.3 cases per 100,000 people per year has been detected [11].

Patients with UC are generally at an increased risk of developing CRC compared to the general population. This risk is in addition to the primary risk of developing intermittent CRC. The mean age at diagnosis of CRC related to UC ranges from 43.2 to 50.9 years. In addition to age, important risk factors include prevalence of colon disease, age of onset and duration of disease, degree of inflammation, and presence of primary sclerosing cholangitis. All of these factors are necessary to predict patients' general risks and to discuss treatment options [12].

Methodology

Design and setting of the study: quasi-experimental study design carried out on 50 patients for the case group and 30 patients of control group for patient attending to Gastroenterology and Hepatology Teaching Hospital, for the period of March 2021 to September 2021

The program and the study instrument: the researchers construct a program dealing the measurement should be applied by ulcerative patients to avoid the complication of disease which as the important of adherence patients with medication, and the main healthy diet, and the questionnaire was consisted of 3 parts, part one the socio-demographic consist of 8 items which as, age, gender, marital status, level of education, occupation, monthly income, and residency. Part two about adherence of patient for medication which consist of 12 items, Part three about adherence of patient for diet include 14 items.

Validity and Reliability: The validity of the questionnaire and program was achieved by 12 experts from different scientific branches having at least 9 years of experience in their field of work. The reliability of the questionnaire was estimated by determining the internal consistency of the instrument by

calculating the Cronbach's Alpha correlation coefficient which as= (**0.824**)

Data Collection: The data were analyzed by using the program of IBM Statistical Package of Social Sciences (SPSS) Version 26. Both descriptive statistical analysis {include frequencies (F), percentages (%), cumulative percent, MS, and standard deviation (SD)} and inferential statistical analysis approaches were used in order to analyze and assess the results of the study, ANOVA for equality of Means.

Results

Table (1): Distribution of the Study Sample According to Socio-Demographic Characteristics

No.	Characteristics		Study group		Control group	
			F.	%	F.	%
1	**Age (year)**	18 – 27	13	26	6	20
		28 – 37	15	30	12	40
		38 – 47	10	20	6	20
		48 – 57	6	12	6	20
		58 – 67	5	10	0	0
		68 – 77	1	2	0	0
		Total	*50*	*100*	*30*	*100*
2	**Gender**	Male	36	72	15	50
		Female	14	28	15	50
		Total	*50*	*100*	*30*	*100*
3	**Marital Status**	Single	21	42	10	33.3
		Married	26	52	16	53.3
		Widowed/er	2	4	2	6.7
		Divorced	1	2	2	6.7
		Total	*50*	*100*	*30*	*100*
4	**Occupation**	Governmental employee	18	36	2	6.7
		Private employee	15	30	1	3.3
		Jobless retired	4	8	0	0
		Working retired	2	4	11	36.7
		Housewife	7	14	5	16.7
		Students	4	8	7	23.3
		Total	*50*	*100*	*30*	*100*
5	**Level of education**	Don’t read/write	0	0	9	30.0
		Read & write	1	2	8	26.7
		Primary study graduated	3	6	3	10.0
		Intermediate study graduate	18	36	0	0
		Secondary study	9	18	9	30
		Institute	12	24	1	3.3
		College & higher study graduate	7	14	0	0
		Total	*50*	*100*	*30*	*100*
6	**Residency**	Rural	11	22	2	6.7
		Urban	39	78	28	93.3
		Total	*50*	*100*	*30*	*100*
7	**House type**	Rented	28	56	5	16.7

		Own	22	44	25	83.3
		Total	*50*	*100*	*30*	*100*
8	**Monthly income**	Sufficient	21	42	21	70
		Barely sufficient	27	54	9	30
		Insufficient	2	4	0	0
		Total	*50*	*100*	*30*	*100*

No: Number, F.: Frequency, %: Percentage

Table (1): presented the socio demographic characteristic of the study sample for case and control which of 30% of case group and 40% of control group at age 28-37 years old, 72% of case group, and 50% of control group was males. 52% of case group and 53.3% of control group was married. 36% of case group was governmental employees, and 36.7% of control group was retired, high present 36% of case group graduated from intermediate study graduated, and 33.4% of control group was read and write. The high present of patients social status for case and control group was married which of 52% and 53.3% respectively, High percent of case and control group was lives in urban which of (78%), 93.3% respectively, 56% of case group was rented housing, and 83.3% of control group have own housing, 54% of case group at barley sufficient income and 70% of control group have sufficient income.

Table (2): Patients' Adherence for Diet at Pre-and Post-test of Instruction Program for Case and Control Group

List	Items	Study group (N=50)								Control group (N=30)							
		Pre-test				Post-test				Pre-test				Post-test			
		Not adherence		adherence		Not adherence		adherence		Not adherence		adherence		Not adherence		adherence	
		f	%	f	%	f	%	f	%	f	%	f	%	f	%	f	%
1	Drink tea and coffee	50	100	0	0	48	96	2	4	27	90	3	10	27	90	3	10
2	Drink ready-made juices	24	48	26	52	14	28	36	72	20	66.7	10	33.3	16	53.3	14	46.7
3	Eat sweet/nuggets, jelly	28	56	22	44	20	40	30	60	20	66.7	10	33.3	15	50	15	50
4	Eat fried food	19	38	31	62	7	14	43	86	20	66.7	10	33.3	14	46.7	16	53.3
5	Eat salty snacks	17	34	33	66	3	6	47	94	18	60	12	40	15	50	15	50
6	Eat sugar and honey	40	80	10	20	42	84	8	16	26	86.7	4	13.3	24	80	6	20
7	Eat fruit 1-2 times a day	34	68	16	32	13	26	37	74	18	60	12	40	10	33.3	20	66.7
8	Eat legumes and green vegetables	19	38	31	62	10	20	40	80	7	23.3	23	76.7	5	16.7	25	83.3
9	Eat salad once a day	11	22	39	78	10	20	40	80	3	10	27	90	4	13.3	26	86.7
10	Eat saturated fat	20	40	30	60	0	0	50	100	14	46.7	16	53.3	12	40	18	60
11	Eat butter, cream,	20	40	30	60	1	2	49	98	21	70	9	30	17	5.7	13	43.3
12	Eat out like Wedding	30	60	20	40	38	76	12	24	20	66.7	10	33.3	17	56.7	13	43.3
Total percentage		53.6%		**45.7%**		37.6%		**62.4%**		60.5%		**39.5%**		47.1%		**52.9%**	

N: Sample size, f: Frequency, %: Percentage

The results of table 2 revealed that the patient adherence for patient diet at pre-and posttest for instruction program which of 45.7% of them was adherence for balance diet at pretest for case and their adherence was improved after instruction program to 62.4%. The control group also change their adherence despite of not exposed to program which of 39.5% at pretest, and change their adherence for diet to 52.9% at posttest.

Table (3): Overall Evaluation of Patients' Adherence to Medication among Case and Control Groups

Levels of Adherence	Case Group (N= 50)								Control Group (N= 50)							
	Pre-test				Post-test				Pre-test				Post-test			
	f	%	M.S	SD	f	%	M.S	SD	f	%	M.S	SD	f	%	M.S	SD
Poor	14	28	24.68	5.811	0	0	29.92	2.625	1	3.3	26.83	3.097	15	50	20.90	3.067
Fair	20	40			14	28			19	63.3			15	50		
Good	16	32			36	72			10	33.3			0	0		
Total	***50***	***100***			***50***	***100***			***30***	***100***			***30***	***100***		

f: Frequency, %: Percentage, M.S: Mean of score, SD Standard deviation
Poor= 12 – 20, Fair = 21 – 28, Good= 29 – 36

This table indicates that patients in the case group showing fair level of adherence to treatment during the pre-test time (40%) while they show good adherence to treatment during the post-test time (72%); the mean difference indicates they get improvement in their adherence to treatment.

Table (4): Patients' Adherence for Medication at Pre-and Posttest for Case and Control Groups

List	Items	study Group (N=50)						Control Group (N=30)					
		Pre-test %			Post-test %			Pre-test %			Post-test %		
		Never	Sometimes	Always	Never	Sometimes	Always	Never	Sometimes	Always	Never	Sometimes	Always
1	forget to take your prescribed medication?	60	4	36	72	28	0	40	56.7	3.3	46.7	46.7	6.6
2	How many times have you decided not to take the prescribed medication?	60	40	0	90	10	0	43.3	50	6.7	56.7	36.7	6.7
3	Do you eat salty food?	34	18	48	28	2	70	30	56.7	13.3	40	50	10
4	Do you put a lot of salt on food?	44	12	44	88	4	8	56.7	36.7	6.7	60	30	10
5	Do you eat ready-to-eat food? (Burgers, cooking fat, fish and chips)	8	22	70	12	88	0	0	10	90	3.3	73.3	23.3
6	Get the next appointment before leaving the clinic	2	74	24	94	6	0	0	100	0	3.3	10	86.7

7	Forget the schedule?	42	6	52	68	32	0	16.7	0	83.3	26.7	70	3.3
8	You leave the dispensary without getting the prescribed pills because.	72	6	22	92	8	0	46.7	0	53.3	53.3	0	46.7
9	Are you out of treatment for colon ulcers?	26	16	58	96	4	0	16.7	0	83.3	40	0	60
10	Deliberately not taking colon ulcer treatment 1-2 days before going to the clinic. ?	46	4	0	100	0	0	83.3	0	16.7	90	0	10
11	Skip your pills when you feel sick?	58	2	40	100	0	0	70	0	30	70	0	30
12	Are you taking someone else's tablets?	42	8	50	100	0	0	26.7	66.7	6.7	60	0	40
Total percentage		***41.2*** *%*	*16.7 %*	*42.1 %*	***78.3****%*	*15.2 %*	*6.5%*	***35.8****%*	*31.4%*	*32.8%*	***45.8****%*	*26.4%*	*27.8%*

N: Sample size, %: Percentage

Table 3: presents the patients' adherence to medication at pre-and post-instruction program for case and control group. Which of the high percent 42.2% of the case group was not adherence for their medication at pre-test, and their adherence was improved 78.3 % at posttest, while the adherence for control group for their medication was 35.8% at pretest and changes to 45.8% at posttest.

Table (5): Effectiveness of Preventive Measure Program on Patients Adherence for Medication and Diet

Adherence for medication and diet	**Case Group (N=50)**				
	M.	**t**	**df**	**p-value**	**Sig.**
Pre-test	24.68	7.579	49	.001	**H.S**
Post-test	29.92				

Table 5: revealed that there were high significant between the effectiveness program regarding adherence to medication and diet in the case group at p≥ 0.05.

Table (6): Patients Adherence Comparative Differences between to Medication and Diet Relative to their Age

Variables \ **Age**		**Study Group**					
		Sum of Squares	**df**	**Mean Square**	**F**	**p-value**	**Sig.**
Adherence to medication & diet	Between Groups	714.713	5	142.943	6.690	.001	**H. S**
	Within Groups	940.167	44	21.367			
	Total	1654.880	49				

df: Degree of Freedom, F-statistics, P-value: probability value, H.S: High *Significant*

Table 4: revealed that there were high significant between the effectiveness of instruction program regarding adherence of patient for diet and medication with patient age.

Table (7): Patients Adherence Comparative Differences between to Medication and Diet Relative to their gender.

Variables / Gender		Study Group (N=50)					
		M	**SD**	**t**	**df**	**P ≤ 0.05**	**Sig**
Adherence to medication & diet	Male	24.61	5.426	-.133	48	.895	**N.S**
	Female	24.86	6.927				

M: Mean, SD: Standard deviation, t: t-test, df: Degree of freedom, N.S: Not significant

There were not statistical differences between the effectiveness of instruction program regarding patient adherence to medication and diet with gender at p-value 0.05 level.

Table (8): Patients Adherence Comparative Differences between to Medication and Diet Relative to their Social Status.

Variables / Social status		Study Group (N=50)					
		Sum of Squares	**df**	**Mean Square**	**F**	**p-value**	**Sig.**
Adherence to medication & diet	Between Groups	358.680	3	119.560	4.243	.010	**S**
	Within Groups	1296.200	46	28.178			
	Total	1654.880	49				

df: Degree of Freedom, f: F-statistics, P-value: probability value, Sig: Significance

Table 6: shows there were significant between the effectiveness of instruction program regarding adherence to medication and diet with social status at p-value= .010.

Table (9): Patients Adherence Comparative Differences between to Medication and Diet Relative to their Level of education.

Variables / Education level		Study Group (N=50)					
		Sum of Squares	**df**	**Mean Square**	**F**	**p-value**	**Sig.**
Adherence to medication & diet	Between Groups	172.924	5	34.585	1.027	.414	N.S
	Within Groups	1481.956	44	33.681			
	Total	1654.880	49				

df: Degree of Freedom, f: F-statistics, P-value, N.S: Not Significant

The results of table 7 presented that there were no statistical differences between the effectiveness of instruction program regarding patient adherence to medication and diet with level of education at $p \geq 0.05$.

Table (10): Patients Adherence Comparative Differences between to Medication and Diet Relative to their residency.

Variables \ Residency		Study Group (N=50)					
		M	SD	t	df	P ≤ 0.05	Sig
Adherence to medication & diet	Rural	25.55	4.947	.555	48	.581	N.S
	Urban	24.44	6.069				

M: Mean, SD: Standard deviation, t: t-test, df: Degree of freedom, N.S: Not significant

Table 8: Revealed that there were not statistical differences between the effectiveness of instruction program regarding adherence to medication & diet with residency at $p \geq 0.05$.

Table (11): Patients Adherence Comparative Differences between to Medication and Diet Relative to their Monthly Income.

Variables \ Income		Study Group (N=50)					
		Sum of Squares	df	Mean Square	F	p-value	Sig.
Adherence to medication & diet	Between Groups	172.924	5	34.585	1.027	.414	N.S
	Within Groups	1481.956	44	33.681			
	Total	1654.880	49				

df: Degree of Freedom, f: F-statistics, P-value: probability value, N.S: Not Significant

Table 9: There were not statistical differences between the effectiveness of instruction program regarding patient adherence to medication and diet with income at $p \geq 0.05$.

Discussion

The risk of colorectal cancer for any patient with ulcerative colitis is known to be elevated. Therefore, the improvement of patient's awareness to prevent the development of disease is very important, which of 30% of case group and 40% of control group at age 28-37 years old, 72% of case group, and 50% of control group was males. 52% of case group and 53.3% of control group was married. 36% of case

group was governmental employees, and 36.7% of control group was retired, high present 36% of case group graduated from intermediate study graduated, and 33.4% of control group was read and write.

The high present of patient's social status for case and control group was married which of 52% and 53.3% respectively. High percent of case and control group was lives in urban which of (78%), 93.3% respectively, 56% of case group was rented housing, and 83.3% of control group have own housing.54% of case group at barley sufficient income and 70% of control group have sufficient income. A study examine in their study 60 (case and control) group of patients with ulcerative colitis in Iraq. To find out the effectiveness of instruction program on patient knowledge toward improve their awareness about their disease, the patients characteristics of their study was 56.6 % of case, and control group was females at age groups (23-28) years old for two groups, 56.7% of them was married at institute & collage graduated, 66.7% was Government employment [13].

Certain nutrients may help fight the irritation and swelling in gut caused by UC. Therefore, the adherence of patients for balance diet is important concept for patients. The present study funded that the instruction program related to balance diet on patients is effective through the result for pre-and posttest which of 45.7%, 62.4% respectively, and the control group also change their adherence despite of not exposed to program which of 39.5% at pretest, and change their adherence for diet to 52.9% at posttest. Longhurst and Watson, (2022) stated in their report that the right diet plan is usually a process of elimination. The cut out or limit certain foods that seem to aggravate the symptoms, and then see how to feel, and there no specific diet is proven or "best" to help with UC. However, having a plan in place can help some people with the condition manage their symptoms [14].

The results of present study revealed that 42.2% of the case group was not adherence for their medication at pre-test. In addition, their adherence was improved to78.3 % at posttest of instruction program, and the adherence of control group for their medication was 35.8% at pretest and changes to 45.8% at posttest. A study investigates the level of adherence in patients with UC in real world settings. In a cohort study of 92 patients with clinically inactive disease followed for more than 48 weeks with appointments every 12 weeks, 43% of patients were found to be 100% adherent, whereas in the remaining 57% of patients, adherence did not fall below 95%. However, these patients had consented to being studied, making it is likely that they did not reflect common, real world behavior [15].

A quasi-experimental study in AL-Razi center in AL-Basra governorate in Iraq on (50) hypertensive patients to find out the effectiveness of instruction program on patients' adherence for medication, their finding revealed that 75.3% of case group was compliance for medication uses, and the patients not compliance was reduced to 24.7%. After instruction program [16].

Ulcerative colitis treatment has two main goals. The first is to make you feel better and give your colon a chance to heal. The second is to prevent more flare-ups. You may need a combination of diet changes and medication. The present study presented many sociodemographic

variables was affected with the patients' adherence. Which as that there were high significant between adherence of patient for diet and medication with patient age. And There were not statistical differences with gender, there were significant between with social status, A study evaluate 100 patients in Al- Ashraff City in Iraq to find out the relationship between patients' compliance for DASH regimen and their demographic characteristics. Their finding revealed that there were no comparative differences between patients' adherence to medication, diet and their age, gender, educational level, social status, economic status, and occupation at P≤0.05 level [(17)].

Conclusions

The instruction program have a positive effect on case group study to improve patient's adherence for balance diet and medication to avoid deterioration of patient's health status, and then to reduces the incidence of colorectal cancer.

Recommendations

The study recommends increase the patient's health awareness toward the complication of ulcerative colitis, and establishing rehabilitation units in hospitals for guiding the patient about the importance of adhering to a balanced diet and treatment.

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