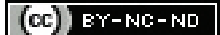Original Article

Education Section

Effect of Educational Intervention based on Pender's Health Promotion Model on Self-care Behaviours of Patients with Colorectal Cancer undergoing Chemotherapy: A Quasi-experimental Study

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ABSTRACT

Introduction: Colorectal cancer is the third most common malignancy in Iran. Self-care is one of the most effective non pharmacological interventions for controlling the effects of the disease and the side-effects of drugs. An educational intervention based on Pender's health promotion model, which predicts health behaviours and self-care, can be implemented.

Aim: To investigate the effect of an educational intervention based on Pender's health promotion model on improving self-care behaviours among patients with colorectal cancer.

Materials and Methods: This quasi-experimental study was conducted at Omid and Imam Reza Hospitals in Mashhad, Iran from June to August 2021. A total of 160 participants were divided into two groups: the experimental group (n=80) and the control group (n=80). The experimental group received four self-care education sessions (two sessions by a nurse and two sessions by peers), while the control group received no intervention. Data were collected using a questionnaire before, immediately after, and three months after the educational intervention. Statistical analysis was performed using independent samples t-test and Repeated Measures Analysis of Variance (RMANOVA).

Results: The study included 103 male patients (64.4%) and 57 female patients (35.6%). At one month and three months after the intervention, the scores for awareness, attitude, behaviour, and the constructs of Pender's health promotion model (self-efficacy, perceived social support, perceived benefits, perceived barriers, perceived emotions) significantly increased in the intervention group compared to the control group (p-value <0.001).

Conclusion: The findings of this study indicate that the educational intervention based on Pender's health promotion model effectively promotes self-care behaviours among patients with colorectal cancer.

Keywords: Awareness, Colon malignancy, Non pharmacological intervention, Perceived health

INTRODUCTION

Colorectal cancer is one of the most common cancers of the gastrointestinal tract, accounting for 10% of new cancer cases and ranking as the third most common malignancy after breast and lung cancer [1]. It is the second leading cause of cancer-related deaths, responsible for 9.4% of cancer deaths, second only to lung cancer, which accounts for 18% of cancer-related deaths [2]. Clinical manifestations in patients with colorectal cancer depend on the tumour's location, size, and the presence or absence of metastasis [3].

In 2020, approximately 1.15 million new cases of colon cancer and 732,000 new cases of rectal cancer were reported worldwide [4]. The number of deaths attributed to these types of cancer in 2020 included 577,000 deaths related to colon cancer and 339,000 deaths related to rectal cancer. The majority (88%) of new cases in the United States in 2020 occurred in individuals aged 50 years and older [5]. While the prevalence of the disease is equal between men and women under 45 years of age, it is 40-50% higher in men than in women in the 55-74 years age group [6]. The diagnosis, treatment, and long-term management of the disease can cause mental and physical stress for patients during chemotherapy. Although chemotherapy, along with surgery and radiation therapy, is one of the main treatments for cancer, it also reduces the quality of life in patients [6].

A combination of pharmacological and non pharmacological interventions is typically used to effectively manage the symptoms of the disease and minimise the negative and side-effects caused by chemotherapy drugs [7]. Self-care is one of the most effective non pharmacological interventions for controlling the effects of the disease and managing chemotherapy side-effects [8]. Self-care encompasses all activities aimed at preventing, treating, and recovering from diseases. It enhances quality of life, improves patient satisfaction, and promotes rehabilitation [9]. Recent evidence suggests that engaging in self-care behaviours is beneficial in managing disease symptoms, chemotherapy side-effects, and improving quality of life in patients with cancer, including those with colorectal cancer [10].

Self-care management and the reduction of complications in chronic diseases impact patients, healthcare providers, and hospitals. Therefore, in current health policies, patient education on self-care is of great importance [11]. Identifying patient needs is one of the initial steps in the nursing process to plan and implement nursing interventions and prevent subsequent complications [12]. Increasing awareness of chemotherapy side-effects and methods to control them helps patients properly care for themselves. As a result, acquiring the necessary knowledge and skills to manage chemotherapy side-effects through self-care strategies is crucial for these individuals [13]. Pender's health promotion model has been widely used as a framework to explain self-care and health-promoting behaviours [14].

This model facilitates behaviour change, commitment to a plan, commitment to performing a specific action despite competing priorities, and performing actions at specific times with specific contexts and purposes [12].

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Considering the unique cultural, social, and economic conditions of the region and the absence of similar studies to date, this research project was designed and conducted at Omid Hospital, affiliated with Mashhad University of Medical Sciences. The aim was to investigate the effects of an educational intervention based on Pender's health promotion model to improve self-care skills in managing the disease and addressing the acute and chronic complications resulting from colorectal cancer treatment with chemotherapy.

MATERIALS AND METHODS

The present quasi-experimental study was conducted at Omid and Imam Reza Hospitals in Mashhad from June to August 2021. The study commenced after obtaining informed written consent from the patients and approval from the ethics committee (ethics ID IR.ZAUMS.REC.1400.022) of Zahedan University of Medical Sciences.

Inclusion criteria: Patients with colorectal cancer who were aged >18 years and had undergone chemotherapy atleast once a month or more were included in the study.

Exclusion criteria: Patients with mental illness and functional disability were excluded from the study.

Sample size: The sample size was calculated using the formula for comparing means across three different time points with an alpha error of 5% and power of 90%. Based on the values from the previous study by Seraji M et al., a total of 80 patients in the intervention group and 80 patients in the control group were calculated for the study [14].

$$m=\frac{2(Z_\alpha+Z_{1-\beta})^2\sigma^2.(1-\rho)}{nS_t^2d^2}.DE$$

α=0.05, β=0.1, z=27.04, ρ=0.6, n=4, S2=1.67, d=1, DE=1.5

Data collection: A pretest questionnaire was developed by the researchers (with CVI=0.81 and CVR=0.77) based on the previous study [14]. The questionnaire was completed by the researchers through interviews with the patients. The interviewer visited the oncology ward of the two hospitals on all days of the week and during all three working shifts. The questionnaires were completed one hour before chemotherapy when the patient was in good physical condition. The questions asked were about awareness of self-care behaviours (13 questions), attitude (11 questions), self-efficacy (12 questions), perceived barriers (11 questions), perceived benefits (10 questions), perceived emotions (10 questions), perceived support (11 questions), and behaviour (which included 12 items on physical condition registration, 8 questions on dietary compliance, 3 questions on oral and dental health, 1 question on skin and hair health, 2 questions on medication use, 1 question on emotional mobility, and 2 questions on sleep and rest).

For the awareness questions, a spectrum of three options ("Yes", "No", "I don't know") was used. For the attitude, perceived benefits, perceived barriers, perceived support, and perceived self-efficacy questions, a five-option Likert scale ("I completely agree", "I agree", "I have no opinion", "I disagree", "I completely disagree") was used with a minimum score of 1 and a maximum score of 5. For the behaviour questions, a five-point Likert scale ("never", "rarely", "sometimes", "often", "always") was used with a minimum score of 1 and a maximum score of 5.

Intervention: The educational content was designed and evaluated by the researchers based on the needs of the patients and the analysis of the pretest questionnaire. An educational booklet based on the constructs of Pender's health promotion model [12] was used as an educational aid in this program. The intervention group received training from the research team, while the control group received usual training provided by the nurses in the ward.

For the intervention group, four educational sessions were held every week after chemotherapy. These sessions were conducted by peers (patients with proper self-care), nurses, and the researchers. The educational sessions aimed to raise awareness and promote self-care behaviours using the educational booklet and strategies based on the constructs of Pender's health promotion model [Table/Fig-1] [11].

Structure	Strategy
Attitude	The strategy of promoting attitude was offered in group discussion groups and peer to peer support sessions.
Self-efficacy	The strategy of promoting self-efficacy was taught by using encouragement and reinforcement, reducing stress, focusing on successful behaviour, successful experiences of similar people peer to peer support, psychological counselling, education through the educational package (saying positive emphatic statements), and using direct experiences.
Perceived benefits	The strategy of promoting perceived benefits was taught through identifying the precise action, identifying positive benefits, and showing ideas and approaches through holding peer to peer support sessions.
Perceived barriers	The strategy of promoting perceived barriers was taught through correcting any kind of misbehaviour, encouragements and incentives, reassurance through the booklet, and holding peer to peer support.
Perceived social support	The strategy of perceived social support was promoted using a reporting booklet by recording daily self-care reports by the patients and their families and the supervision report by nurse in the ward, follow-up programs through phone calls to oblige the patients and their families to observe self-care behaviours through nurse-family interaction.
Perceived emotion	The strategy of promoting perceived emotion was offered through psychological counseling and education through the educational package to relieve depression.

[Table/Fig-1]: Educational intervention strategy for the construction of Pender health promotion model [11].

After the educational intervention, the patients in the intervention group were provided with self-report booklets for self-care behaviour follow-up. They were instructed to fill in the booklets every two weeks at home. Family supervision and researcher supervision ensured better follow-up, and in case of lack of self-care behaviour, the reasons were investigated based on the patient's report. If necessary, re-education was provided to correct self-care behaviour according to the patient's needs.

One and three months after the last educational intervention, the questionnaires were completed again by both the intervention and control groups. The control group completed the questionnaires without any intervention programs, and their questions were answered using general answers. To adhere to ethical principles, the self-care education program was explained to the control group, and they were provided with the educational package later. After the program was completed, in order to adhere to ethical considerations, the control group received the same education as the intervention group did.

STATISTICAL ANALYSIS

The collected data were analysed using Statistical Package for the Social Sciences (SPSS) software version 18.0. Descriptive summaries, including mean±standard deviation (SD), independent samples t-test, and RMANOVA, were employed to analyse the data.

RESULTS

In the present study, a total of 160 subjects were included, with 80 subjects in each group: the control group and the intervention group. Out of the 160 subjects, 103 (64.4%) were male and 57 (35.6%) were female. Among the total of 160 patients in the study, 36 (45%) were housewives, 32 (40%) were self-employed, and 74 (92.5%) were retired individuals. Regarding marital status, 114 (71.25%) were married and 2 (2.6%) were single. The two groups were not significantly different in terms of demographic variables except for the level of education [Table/Fig-2].

Variable	Control group (n=80)	Experimental group (n=80)	p-value	Variable	Control group (n=80)	Experimental group (n=80)	p-value
				Education			
Age	58.33±5.84	57.56±5.14	0.382	Elementary	22 (27.5)	6 (7.5)	0.001
Gender				Middle high school	29 (36.3)	14 (17.5)	
Male	48 (60)	55 (68.8)	0.248	Diploma	24 (30)	45 (56.3)	
Female	32 (40)	25 (31.2)		Bachelor's degree	5 (6.3)	15 (18.8)	
Job				Marital status			
Seeking employment	5 (6.3)	6 (7.5)	0.679	Single	1 (1.3)	1 (1.3)	0.295
Housewife	20 (25)	16 (20)		Married	60 (75)	54 (67.5)	
Self-employed	16 (20)	16 (20)		Spouse separated	3 (3.8)	15 (18.8)	
Retired	34 (42.5)	40 (50)		Spouse passed away	16 (20)	10 (12.5)	
Employee	5 (6.3)	2 (2.5)					

[Table/Fig-2]: Frequency distribution of demographic variables for the control and intervention groups (n=160).
Results are reported as mean±SD and number (%), p-values are computed based on the t-test for continuous variables and the chi-square test for categorical variables

In the present study, there was no significant difference between the two groups before the intervention in the mean scores for attitude, self-efficacy, perceived barriers, and behaviour variables. However, one month and three months after the intervention, the mean scores for all the self-care behaviour variables increased significantly in the intervention group compared to the control group [Table/Fig-3].

known that patients who have more knowledge and awareness are more likely to actively manage their disease and its complications. Acquiring the necessary knowledge and awareness is essential and can only be achieved through education [15]. Similar findings were reported in studies by Babaei A et al., and Majd RK et al., where education increased awareness of self-care behaviours in patients,

Variable	Group	Time			p-value RMANOVA	
		Before intervention Mean±SD	One month after intervention Mean±SD	Three months after intervention Mean±SD	Within the three times	Between the two groups
Awareness	Control	20.26±4.82	43.72±11.83	57.85±8.52	<0.001	0.024
	Intervention	26.78±5.20	61.05±16.73	73.47±2.60	<0.001	
p-value Independent Samples t-test		0.042	=0.015	<0.001		
Attitude	Control	34.20±2.05	38.66±2.33	42.11±3.04	<0.001	0.034
	Intervention	34.27±4.62	41.32±4.25	47.65±4.08	<0.001	
p-value Independent Samples t-test		0.149	<0.001	<0.001		
Self-efficacy	Control	35.00±4.03	39.86±5.08	43.80±6.07	<0.001	0.005
	Intervention	36.56±3.88	45.97±3.39	53.47±4.69	<0.001	
p-value Independent Samples t-test		0.115	<0.001	<0.001		
Perceived social support	Control	37.26±2/42	41.60±2.53	44.73±2.85	<0.001	0.146
	Intervention	36.85±3.85	42.85±3.35	47.11±3.20	<0.001	
p-value Independent Samples t-test		0.030	<0.001	<0.001		
Perceived emotions	Control	28.25±3.05	30.41±3.47	32.55±5.02	0.004	<0.001
	Intervention	28.96±5.69	37.01±2.97	43.88±3.50	<0.001	
p-value Independent Samples t-test		0.052	<0.001	<0.001		
Perceived benefits	Control	38.13±3.67	45.35±5.08	50.70±5.35	0.006	<0.001
	Intervention	39.39±4.67	51.20±5.87	59.19±4.43	<0.001	
p-value Independent Samples t-test		0.048	<0.001	<0.001		
Perceived barriers	Control	34.42±3.60	37.80±3.56	40.17±4.09	0.136	<0.001
	Intervention	33.72±4.01	38.39±3.35	42.51±5.13	0.968	
p-value Independent Samples t-test		0.136	<0.001	<0.001		
Behaviour	Control	77.50±5.69	85.37±6.70	93.70±7.84	0.767	<0.001
	Intervention	78.57±5.37	91.82±6.99	106.22±7.80	0.003	
p-value independent samples t-test		0.670	<0.001	<0.001		

[Table/Fig-3]: Comparison of mean scores for self-care behaviour variables before, one month after, and three months after the intervention among intervention and control groups.

DISCUSSION

The results of the present study indicate a significant increase in the scores for self-care behaviour variables (awareness, attitude, self-efficacy, perceived support, perceived emotions, perceived benefits, perceived barriers, and behaviour variables) in the intervention group during the immediate and three-month follow-ups after the completion of the educational intervention.

The results also showed that the average awareness score in the intervention group increased three months after the study. It is

highlighting the effectiveness of education and raising awareness in self-care management [16,17].

The attitude of patients with colorectal cancer undergoing chemotherapy towards the disease and its control is of great importance. In the present study, the average attitude score significantly increased after three months in the intervention group. This finding was consistent with previous studies that demonstrated the positive impact of education on changing the attitudes of patients towards self-care behaviours [18]. Beringer J et al., also found that providing

education to patients with colorectal cancer can help improve their attitudes towards self-care behaviours [19]. This, in turn, can potentially reduce mortality rates and complications associated with the disease [20].

Individuals with high self-efficacy are more likely to confront challenging tasks rather than avoid them. The results of the present study showed that the average self-efficacy score increased after three months in the intervention group. These findings were consistent with the study by Pooreh S and Nodeh ZH [21]. One possible reason for the improved self-efficacy in present study was the use of peers for education. Proxy experience, which involves observing others in similar situations, is an important construct in self-efficacy theory. When individuals see others who are in the same situation as them succeed in a task, they develop the belief that they can also succeed [22].

Improving the quality of life for patients is an important goal, which can be achieved through the comprehensive care of a patient's physical, mental, social, and spiritual health by both those around the patient and through palliative care in the advanced stages of cancer [23].

The results of the present study demonstrated that the average perceived support score increased three months after the study in the intervention group. These findings are consistent with the study by Masoudiyekta L et al., [24]. In addition to teaching self-care behaviours, it is necessary to involve the patient's family to increase the perceived support received by the patient, as this has been shown to be highly effective in patients with colorectal cancer [25].

The results of the present study also showed that the average perceived emotions scores increased three months after the study in the intervention group. These findings are similar to those of the study by Pender J [11]. Given that patients with colorectal cancer undergoing chemotherapy often experience intense emotions related to their illness, including fear of death, educational interventions that emphasise positive perceived emotions may be more effective [11].

In the present study, the perceived benefits significantly increased in the intervention group after the educational program, which was consistent with the findings of the study by Lundkvist E et al., [26]. Generally, individuals are more likely to engage in behaviours that they perceive to be beneficial. Studies have shown that teaching perceived benefits plays a crucial role in reducing risk-associated behaviours and promoting healthy behaviours, which is also cost-effective [27]. These results are in line with the study by Ahrens CE et al., [28].

Having a proper understanding of the benefits of engaging in self-care behaviours and being aware of the barriers to such behaviours can further motivate patients with colorectal cancer undergoing chemotherapy to engage in self-care. It is therefore important for both patients and healthcare providers to recognise the significance of proper engagement in self-care behaviours and to be aware of the associated benefits and barriers. Identifying barriers is the first step in collaborating with patients who have chronic diseases. The results of the present study showed that the average perceived barriers score increased three months after the study in the intervention group. These findings are supported by the study by Ahrens CE et al., which emphasised the importance of improving self-care strategies by addressing perceived barriers [28].

The results of the present study also demonstrated that the average self-care behaviour score increased in the intervention group, which was consistent with the findings of the study by Abdollahi A et al., [29]. Teaching self-care behaviours in colorectal cancer patients improves their health and increases adherence to prescribed treatment methods, thereby reducing physical and mental problems in this patient population.

Limitation(s)

In the present study, a limitation was the difficulty in accessing patients and conducting in-person follow-ups at one month and three months after the intervention due to the Coronavirus Disease-2019 (COVID-19) pandemic.

CONCLUSION(S)

The results of the present study indicate a significant difference in the dimensions of self-care behaviour between the control group and the intervention group after the educational intervention. Therefore, it can be concluded that providing education based on Pender's health promotion model for patients with colorectal cancer undergoing chemotherapy can improve their awareness, attitude, self-efficacy, perceived emotions, perceived benefits, perceived barriers, and behaviour variables related to self-care behaviours.

Based on these findings, it is recommended to apply this model of health education to other diseases and health problems, and to investigate its effectiveness for patients with other chronic diseases. Providing the necessary education for patients with colorectal cancer undergoing chemotherapy within the framework of Pender's health promotion model can enhance their self-care behaviours and improve their overall condition.

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