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Effect of Pre-Operative Health Education Program on Post-Operative Health Outcomes of Colorectal Cancer Patients

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Abstract
Background: *Colorectal cancer is the second cause of cancer mortality. Clinical nurse specialists play a vital role in delivering a high-quality care to patients from diagnosis, through to and beyond treatment.*
Aim of study*: evaluate effect of pre-operative health education program on post-operative health outcomes of colorectal cancer patients at gastroenterology center(GEC).*
Method: *a quasi-experimental research design was conducted in GEC at Mansoura University. A purposive sample of (98) patients, who divided into control and study groups. Two main tools were used; Socio-demographic characteristics and patient's health relevant data, and Post-operative patient's health outcomes sheet (complications assessment sheet, diagnostic studies assessment sheet, quality of life assessment sheet).*
Results*: The present study revealed the SF-36 domains health related quality of life, of the study and control groups were (2.57±1.44 & 2.59±1.62) respectively, post-implementation of health education program compared to (3.26±1.19& 2.57±1.44) respectively pre-implementation, with highly statistically significant difference (Pvalue-0.000). The study & control groups were discriminated statistically regarding to occurrence of complications.*
Conclusion*: the study group showed positive effect of health education program provided by an improvement in their health outcomes after implementation of health education program compared to control group.*
Keywords: *Colorectal Cancer's Patients, Health Education Program, Health Outcomes, Post-Operative, Pre-Operative.*

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I. Introduction

Colorectal cancer (CRC) is the third most wide-spread cancer globally, consecutive to lung and breast cancers, mainly in developed countries. It correlates with old age specially the fifties and so forth. [1, 2, 3] Colorectal cancer patients suffer from disease symptoms, such as change in bowel movements, abdominal pain, fatigue, blood loss, anemia, and weight loss, and other treatment related symptoms as fatigue, anxiety, depression, pain, and nausea, which can directly impair quality of life (QoL) particularly for elderly patients and those with co-morbidities. It is essential to find non pharmacological therapies for cancer survivors to improve QoL and long term health status outcomes [4]. Colorectal cancer nurses play a vital part in helping to coordinate care as well as to offer psychological support at time of diagnosis, information and support through treatment decision making, preparation for treatment; ongoing assessment and care during and after treatment to beyond treatment [5].Fixed factors such as age or sex have only a marginal role in QoL and others are potentially modifiable. Therefore, QoL in CRC survivors improved through a wide range of interventions as reducing psychological morbidity, facilitating crisis adaptation with educational programs, self-help groups, psychosocial interventions, cognitive behavioral therapy, coping, and certainly drugs. For symptoms reduction as fatigue, pain and insomnia, a moderate physical activity should be suggested when possible. Bowel symptoms could be reduced with modification of diet and the use of probiotics [6]

Clinical nurse specialists (CNS) with specific expertise in colorectal cancer and excellent communication skills should be available for delivering a high-quality continuous care to patients since diagnosis, through and beyond treatment as cancer specialists are the primary source of information for patients. CNS who has definite expertise in colorectal cancer as well as skills for communication. For providing up-to-date and comprehensive patient information, CNS becomes a vital point for contact between patients as well as multidisciplinary team members [7].

II. Significant of Study

In Egypt, colon cancer was (2.91% and 2.31% in 100,000 populations) in male and female respectively Colon cancer in Egypt, like most of the developing countries, is lower than that of developed countries with western life style .Approximately 39% of colon cancer patients will have locally advanced disease and 19% will be diagnosed with metastatic [8].

It's important for nurse to be educated patient pre-operative, because it gives nurses a possibility to share their knowledge with patients, and provide them with psychological and emotional support when they are facing a difficult situation as cancer diagnosis. It is important for nurses to have reliable information about neoplastic disease [9]. Therefore it is very important to evaluate the effect of pre-operative health education program on post-operative health outcomes of colon cancer patients at GEC-Mansoura University (MU).

III. Methodology

3.1 Aim;

This study aims to evaluate the effect of pre-operative health education program on post-operative health outcomes of colorectal cancer patients at GEC.

3.2 Research hypothesis;

- Implementation of pre-operative health education program may have a positive effect on post-operative health outcomes of colorectal cancer patients.
- Implementation of pre-operative health education program may have no effect on post-operative health outcomes of colorectal cancer patients
-

3.2 Research design;

Quasi-experimental research design was used in this study.

3.4 Setting;

The study was conducted in GEC at Mansoura University.

3.5 Study subjects;

A purposive sample of subjects was selected in this study. Each patient was interviewed two times, preoperative, and four weeks post-operative in GEC-Mansoura University.

The subjects of the study were consisted of (98) patients. Who composed of two main groups divided into:

Group I (Control group): A consisted of (49) patient who was received routine hospital care. And **Group II (Study group):** A consisted of (49) patient who was received hospital care in addition to pre-operative health education program.

Inclusion criteria:

1- Patients are conscious and able to communicate.
2- Patients' age is between 20 and 60 years old.
3- Patients with colorectal cancer and undergoing surgical procedures.
4- Male and female
5- Accept to participate in the study.

Exclusion criteria:

1- Patients with other type of cancer.
2- Patient with colorectal cancer metastasis.

3.6 Tools;

Data were collected by using the following two tools;

3.6.1 Tool I: Socio-demographic characteristics and patient's health relevant data which was consisted of two parts.

Part (1): Socio demographic characteristics:

It was developed by the researcher, and composed of **(seven)** multiple choice questions including age, sex, marital status, residence, level of education, occupation, and nature of work.

Part (2): Patient's health relevant data:
It was developed by the researcher based on reviewing literatures, and scientific references, to assess the past, present and family history for studied subjects, as follows:

a) Past and present health history, which were composed of **(eight)** closed ended questions including; type of chronic illness, drugs used before operation, any past operations, smoking habits, knowing of disease, time of diagnosis of colorectal cancer, signs and symptoms appear, and stage of colorectal cancer.
b) Family health history, which was composed of **(three)** closed ended questions including; family health history of colorectal cancer, the degree of relativity, and family history of colorectal cancer operation.

3.6.4 Tool II: Post-operative patient's health outcomes sheet:
It included three main parts as follows:

Part (1): Complications assessment sheet:
It was designed by the researcher based on reviewing of literatures[10,11] to assess the presence of complications included 4 selected complication, respiratory complications , wound complications lower limb complications ,colostomy complications, and others (fever, bed sores, diarrhea, urinary tract infection, peptic ulcer, ascites, intestinal obstruction, and cardiac problems).

Part (2): Diagnostic studies assessment sheet:
It was designed by the researcher based on reviewing of literatures[12] to assess the laboratory studies as (Complete Blood Count, Liver function tests, Kidney function tests, and electrolytes**),** and radiological results as (CT scan, MRI, Ultra sound, barium enema, colonoscopy, Chest X ray, ECG, and echocardiogram).

Part (3): Quality of life assessment sheet (using SF-36 Scale):
It was adopted from [13, 14] which derived from [15]. it consisted of 36 questions to assess eight health status dimensions: physical functioning questions (3:12); role limitation due to physical health problems questions(13-16); role limitations due to emotional problems questions:(17:19) energy / fatigue questions: (23-27-29-31); emotional well-being questions: (24-25-26-28-30); bodily pain questions: (21& 22); social functioning questions: (20 &32) and general health perception questions: (1,2,33,34,35,36).

Scoring system of SF- 36 Scale questionnaire:
All questions were scored on a scale ranged from 0 to 100. Score 100 representing the highest level of functioning possible. The scores of the items were summed up and the total scores divided by the number of items, giving a mean score. These scores were expressed in means and standard deviations.

3.7 Validity and reliability of the instruments

Content validity were conducted to test the tool for appropriateness, comprehensiveness, relevance, correction and clearance through seven experts in field of medical surgical , critical care nursing, and gastroenterology surgical field in faculty of nursing at Tanta and Mansoura university and faculty of medicine at Mansoura university. Their opinions were elicited regarding the tool format, layout, and consistency of the tool and necessary modifications were done accordingly. Tool was tested for its reliability by test – retest measurement and Cronbach,s alpha. Reliability of colorectal cancer knowledge questionnaire is ranged from r = (Test 0.84 -- Retest 0.87) and Cronbach,s alpha (r. alpha) = 0.68 .

3.8 Pilot study
A pilot study was carried out on 10% of patients from the colorectal cancer who undergoing colorectal cancer surgery at GEC at Mansoura University hospital to assess the clarity and the applicability of the tool, and the necessary modification was done prior to data collection. Those patients were excluded from the study.

3.9 Ethical considerations:
In order to undertake this study, the proposal was submitted for acceptance from research ethical committee, faculty of nursing, Mansoura University. It was also accepted by the authorities or directors of GEC- Mansoura University to be conducted in this setting. All participants were informed clearly about the aims, benefits of the study as well as the procedure of data collection. Each participant was volunteered to participate in this study and could withdraw at any time without penalty or loss of medical care. Involvement in the study does nothing harm to the participants. Then, Verbal and written consent was obtained from each patient enrolled into the study. The participant's anonymity and confidentiality were protected. All the forms were anonymous.

3.10 Field work;
The study was implemented through the following four phases.

Phase I: Prior health education program development
Based on the information obtained from pilot study, in addition to literature, the researcher designed the instruction program under the guidance of the supervisors. Its main aim was to improve performance and health outcomes regarding colectomy among patients. A simple booklet was developed for patients, which covered all information related to colectomy. It's included the following items:

- Brief description of gastrointestinal tract and colon cancer (definition, causes, complication, colostomy care, and drugs needed)
- Health instructions needed for colectomy operation related to respiration and keeping the chest clear, taking medications, infection control measures, general health care and daily routine, nutrition, daily activates, sun ray exposure, sex, and birth control.

The instructional booklet was written in simple Arabic language with different illustrated colored pictures to enhance the learning process and facilitate patients understanding.

Phase II: Pre-test phase (Prior health education program implementation)
After preparing the tool, the study sample was recruited according to the set criteria. This was followed by collecting baseline data. Pre- test questionnaire was administered to the study sample to examine their existing level of knowledge and performance regarding colectomy. Data collection from the patients was performed in surgical unit. The researcher interviewed the patients after introducing herself, took the consent of them to be recruited in the study after explaining the aim of the study, and then distributed the questionnaire sheet after clear explaining the way to fill out. The researcher used tool 1, and tool 2 parts 2& 3 to assess health state before operation. During the interview, the researcher read each items on data collection sheet and explained its meaning to the patients.

Phase III: Implementation phase

- The instructional program implementation has been carried out in surgical unit in GEC at MU
- The instructional program given for each patient alone considering time table for their operation.
- The program was conducted with three sessions; through three days (1 session /day), each session took about 45- 60 minute for study group. Collecting data from control group took about 30- 40 minute.
- First session about (definitions, causes, complication, colostomy care, and drugs needed), second session about (health instructions needed for colectomy operation related to respiration and keeping the chest clear, drugs taking, infection control measures), third session about (health instructions needed for colectomy operation related to general health care and daily routine, nutrition, daily activates, sun ray exposure, sex, and birth control).
- Different teaching and learning methods were used during the sessions which included; interactive lecture, discussion, demonstration& redemonstration, instructional media include pictures, printed handout and video programs. Which was presented in clear and concise form to be used as memorial reference.
- Patients were allowed to ask any interpretation, elaboration or explanation of any item included in the session.
- The duration of program implementation was 16 months which beginning with January 2016 to the end of April 2017.

Phase IV: Evaluation phase (follow-up tests)
The effect of implementing the instructional program on patient's performance and health outcomes was evaluated by the researcher after 1 month of health education program implementation (follow-up) in the out-patient in GEC at MU or by phone, by using tool 2. The results were compared to the pretest results.

3.11 Statistical analysis;
Data were analyzed using Statistical Package for the Social Sciences (SPSS) Version 20. Qualitative variables were presented as number and percentage. Quantitative variables were presented as mean ± SD. To check the difference between two groups independent t-test was used. $P \leq .05$ was considered statistically significant.

IV. Results

Table (1): Control & study group's distribution regarding to their socio-demographic characteristics (n=49):

Items	Study (n=49)		Control (n=49)	
	No	**%**	**No**	**%**
Age (in years)				
20-29	2	4.1%	5	10.2%
30-39	12	24.5%	9	18.4%
40-49	10	20.4%	9	18.4%
50-59	18	36.7%	15	30.6%
60-00	7	14.3%	11	22.4%
Mean ± SD =	46.31 ± 10.28		47.57 ± 11.70	
Gender				
Male	28	57.1%	23	46.9%
Female	21	42.9%	26	53.1%
Marital status				
Single	1	2.0%	26	6.1%
Married	43	87.8%	3	73.5%
Divorced	0	0.0%	36	2.0%
Widowed	5	10.2%	1	18.4%
Residence				
Urban	16	32.7%	5	10.2%
Rural	33	67.3%	44	89.8%
Educational level				
Not read & write	10	20.4%	19	38.8%
Read & write	7	14.3%	13	26.5%
Secondary	20	40.8%	14	28.6%
Universal	12	24.5%	3	6.1%
Job / occupation				
Working	36	73.5%	30	61.2%
Not working	13	26.5%	19	38.8%
Work nature				
Mild	15	30.6%	7	14.3%
Moderate	14	28.6%	14	28.6%
Strong	7	14.3%	11	22.4%

Table (1) shows that the mean age of study and control groups were (46.31 ± 10.28 & 47.57 ± 11.70) respectively. The males were more prevalent than females in study group (57.1%), while, in control group females were more prevalent than males (53.1%). The majority of study group (87.8%) was married, while (73.5%) of control group were married. The table also shows that (67%) and (89.8%) of study and control groups respectively were living in rural area. (40.8%) of study group had secondary education while, (38.8%) of control group not able to read and write. Finally, (73.5%) and (61.2%) of study and control group respectively were working. In relation to work nature (30.6%) of study group had mild effort, while, (28.6%) of control group had moderate effort.

Table 2: Control & study group's distribution regarding to their health history (n= 49):

Items	Study (n=49)		Control (n=49)	
	No	**%**	**No**	**%**
Chronic diseases				
Yes	15	30.6%	17	34.7%
No	34	69.4%	32	65.3%
Medication taking				
Yes	16	32.7%	18	36.7%
No	33	67.3%	31	63.3%
History of operation				
Yes	9	18.4%	4	8.2%
No	40	81.6%	45	91.8%
Smoking				
current smoking	11	22.4%	7	14.3%
previous	3	6.1%	5	10.2%
No	35	71.4%	37	75.5%
knowing disease				
Yes	26	53.1%	13	26.5%
No	23	46.9%	36	73.5%

Current diagnosis				
<1 month	15	30.6%	7	14.3%
1- 3 month	19	38.8%	35	71.4%
>3 months	15	30.6%	7	14.3%
S &S appeared Mean ± SD =	**3.49 ± 1.45**		**3.20 ± 1.24**	
Knowing cancer stage				
Yes	5	10.2%	0	0.0%
No	44	89.8%	49	100.0%
Number of stage				
First	0	0%	0	0%
Second	4	8.2%	0	0.0%
Family history				
Yes	11	22.4%	5	10.2%
No	38	77.6%	44	89.8%
Degree of relativity				
1st degree	10	20.4%	3	6.1%
2nd degree	1	2.0%	2	4.1%
Relative history of colectomy				
Yes	7	14.3%	4	8.2%
No	3	6.1%	1	2.0%
I don't know	1	2.0%	0	0.0%

S& S = signs and symptoms

Table (2) shows that, (30.6%) and (34.7%) of study and control groups respectively have had chronic diseases. The majority of study and control groups (71.4%) and (75.5%) respectively wasn't smoker. The majority of study group (53.1%) was knowing their diseases. The majority of study and control groups (38.8%) and (71.4%) respectively were diagnosed 1-3 months. Also, (89.8%) and (100%) of study and control groups respectively were not knowing cancer stage. The table also shows that (77.6%) and (89.8%) of study and control groups respectively didn't have family history of colorectal cancer. While, (20.4%) and (6.1%) of study and control groups respectively had first degree relative.

Figure (1): Distribution of the control and study groups related to chronic disease

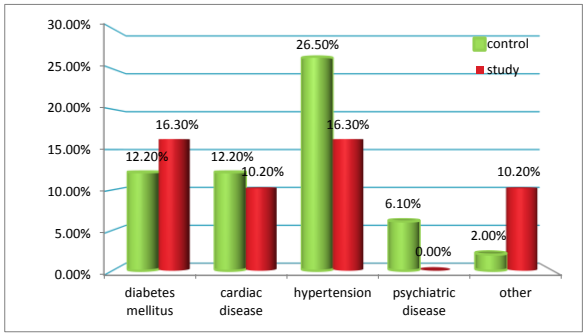

Figure (1) shows that diabetes mellitus and hypertension were the most common chronic diseases of the study group (16.3%). While hypertension was the most common chronic diseases of the control group (26.50%).

Figure (9): Distribution of the control and study groups related to severity of smoking

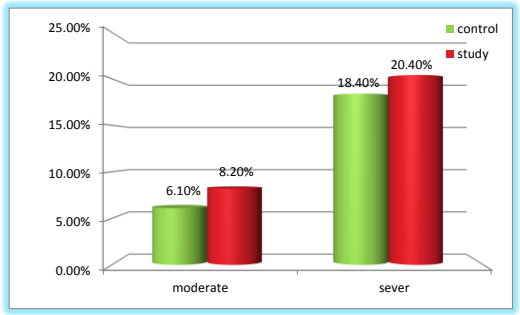

Figure (2) shows that (20.4%) and (18.4%) of and control study groups respectively were severe smoked.

Table (3): Comparison between the control and study groups according to occurrence of complications after 1 month from operation (n= 49):

Items	Study (n=49)		Control (n=49)		Significance test
	No	%	No	%	
Pleural effusion	2	4.1%	1	2.0%	$\chi2(0.344)$ p (0.558)
Chest infection	10	20.4%	9	18.4%	$\chi2(0.065)$ p (0.798)
Dyspnea	2	4.1%	1	2.0%	$\chi2(0.344)$ p (0.558)
Wound infection	12	24.5%	16	32.7%	$\chi2(0.800)$ p (0.371)
Wound hematoma	1	2.0%	3	6.1%	$\chi2(1.043)$ p (0.307)
Wound dehiscence	2	4.1%	4	8.2%	$\chi2(0.710)$ p (0.399)
Fistula	1	2.0%	0	0.0%	$\chi2(1.010)$ p (0.315)
DVT	1	2.0%	0	0.0%	$\chi2(1.010)$ p (0.315)

LL edema	4	8.2%	5	10.2%	$\chi2(0.122)$ p (0.727)
Joints' problems	1	2.0%	0	0.0%	$\chi2(1.010)$ p (0.315)
Muscles' problem	1	2.0%	0	0.0%	$\chi2(1.010)$ p (0.315)
Hernia	2	4.1%	1	2.0%	$\chi2(0.344)$ p (0.558)
Infection	4	8.2%	6	12.2%	$\chi2(0.445)$ p (0.505)
Retraction	3	6.1%	0	0.0%	$\chi2(3.095)$ p (0.079)
obstruction	2	4.1%	0	0.0%	$\chi2(2.042)$ p (0.153)
Fever	19	38.8%	15	30.6%	$\chi2(2.042)$ p (0.153
Bed sores	1	2.0%	1	2.0%	$\chi2(0.721)$ p (0.396)
Diarrhea	1	2.0%	2	4.1%	$\chi2(0.344)$ p (0.558)
Ascites	2	4.1%	1	2.0%	$\chi2(0.344)$ p (0.558)
Intestinal obstruction	3	6.1%	0	0.0%	$\chi2(3.095)$ p (0.079)

Table (3) reports that, statistically significant difference wasn't present between two groups regarding to occurrence of complications after 1 month post operatively.

Table (4): *Comparison between the control and study groups according to laboratory and radiological examination pre and post implementation of health education program (n=49):*

Items	**Pre**				**Post**				**Significance test**
	Study n=49		**Control n=49**		**Study n=49**		**Control n=49**		
	No	**%**	**No**	**%**	**No**	**%**	**No**	**%**	
Hgb									
Low	36	73.5%	31	63.3%	44	89.8%	46	93.9%	$\chi2$ (0.544)
Normal	13	26.5%	18	36.7%	5	10.2%	3	6.1%	p (0.461)
Serum albumin									
Low	11	22.4%	2	4.1%	38	77.6%	49	100%	$\chi2$ (12.391)
Normal	38	77.6%	47	95.9%	11	22.4%	0	0.0%	p (0.000) **
CT scan									
Normal	0	0.0%	0	0.0%	48	98.0%	49	100 %	$\chi2$ (1.010)
Abnormal	48	98.0%	49	100. %	0	0.0%	0	0.0%	
Ultrasound									
Normal	0	0.0%	0	0.0%	47	95.9%	49	100%	$\chi2$ (2.042)
Abnormal	49	100. %	49	100 %	2	4.1%	0	0.0%	p (0.153)
MRI									
Normal	1	2.0%	0	0.0%	47	95.9%	49	100.%	$\chi2$ (2.042)
Abnormal	47	95.9%	49	100 %	1	2.0%	0	0.0%	p (0.360)
Colonoscopy									
Normal	-	-	0	0.0%	47	95.9%	49	100.%	$\chi2$ (2.042)
Abnormal	48	98.0%	49	100 %	1	2.0%	0	0.0%	p (0.360)
Barium Enema									
Normal	1	2.0%	1	2.0%	47	95.9%	49	100.%	$\chi2$ (2.042)
Abnormal	44	89.8%	48	98.0%	1	2.0%	0	0.0%	p (0.360)
ECG									
Normal	42	85.7%	49	100. %	44	89.8%	49	100.%	$\chi2$ (5.269)
Abnormal	7	14.3%	0	0.0%	5	10.2%	0	0.0%	p (0.022)*
Echo									
Normal	1	2.0%	0	0.0%	-	-	-	-	$\chi2$ (5.269)
Abnormal	5	10.2%	0	0.0%	5	10.2%	0	0.0%	p(0.022)*

Table (4) illustrates that, the study & control groups were discriminated statistically regarding to serum albumin, elctrocardiogram and echocardiogram post-implementation of health education program at p value= (0.000, 0.022 &.0.022) respectively.

Table 5: Comparison between the control and study groups according to the total score of SF-36 Domains pre and post- implementation of health education program (n=49):

SF-36Domains	Pre		Post		Significant test
	Study n=49	Control n=49	Study n=49	Control n=49	
	Mean ± SD=	Mean ± SD=	Mean ± SD=	Mean ± SD=	
General health	3.88 ± 0.93 Min 3 - Max 5	3.90 ± 0.94 Min 3- Max 5	2.95 ± 0.68 Min 2 - Max 5	3.48 ± 0.85 Min 1- Max 5	t (8.34) p (0.000)*
Physical function	2.80 ± 0.40 Min 2 - Max 3	2.75 ± 0.46 Min 1- Max 3	1.51 ± 0.57 Min 1- Max 3	1.16 ± 0.45 Min 1- Max 3	t (10.50) p (0.000)*
Role limitations due to	1.92 ± 0.27	1.80 ± 0.40	1.04 ± 0.19	1.01 ± 0.10	t (1.69)

physical health problem	Min1 - Max 2	Min 1- Max 2	Min1 – Max 2	Min1 – Max 2	p (0.09)
Role limitations due to emotional problem	1.92 ± 0.27 Min1 - Max 2	1.80 ± 0.40 Min 1 - Max 2	1.03 ± 0.18 Min1 – Max 2	1.01 ± 0.08 Min1 – Max 2	t (1.65) p (0.10)
Social function	4.12 ± 0.90 Min 2 - Max 5	3.92 ± 1.05 Min 2 - Max 5	2.83 ± 0.54 Min 2 - Max 4	3.88 ± 0.58 Min 2 - Max 5	t (13.17) p (0.000)*
Bodily pain	4.55 ± 0.89 Min 2 - Max 5	4.47 ± 0.98 Min 2 - Max 5	3.23 ± 0.73 Min 1- Max 5	4.27 ± 0.73 Min 3- Max 6	t (9.92) p (0.000)*
Energy and fatigue	4.01 ± 1.30 Min 2 - Max 6	3.93 ± 1.11 Min 2 - Max 6	4.42 ± 0.69 Min 2 - Max 6	4.32 ± 1.24 Min 2 - Max 6	t (1.00) p (0.32)
Emotional well-being	3.82 ± 1.31 Min 2 - Max 6	3.75 ± 1.09 Min 2 - Max 6	4.51 ± 0.73 Min 2 - Max 6	4.00 ± 1.15 Min 2 - Max 6	t (5.87) p (0.000)*
Total	**3.26 ± 1.19 Min 1- Max 6**	**2.57 ± 1.44 Min 1- Max 6**	**2.57 ± 1.44 Min 1- Max 6**	**2.59 ± 1.62 Min 1- Max 6**	**t (0.41) p (0.000)**

Table (5) shows that, the mean score of SF-36 domains health related quality of life (HRQoL) between the control and study groups post-implementation of health education program were (2.95 ± 0.68 & 3.48 ± 0.85) respectively regarding general health, (1.51 ± 0.57 &1.16 ± 0.45) respectively regarding physical function, (2.83 ± 0.54 & 3.88 ± 0.58) respectively regarding social function (3.23 ± 0.73& 4.27 ± 0.73) respectively regarding bodily pain and (4.51 ± 0.73 & 4.00 ± 1.15) respectively regarding emotional well-being, statistically significant difference was high as P value = (0.000, 0.000, 0.000, 0.000 & 0.000) respectively. Regarding the total score of SF-36 domains HRQoL, the table demonstrates that, the total mean score of the study and control groups were (2.57 ± 1.44 & 2.59 ± 1.62) respectively post-implementation of health education program compared to (3.26 ± 1.19& 2.57 ± 1.44) respectively pre-implementation of health education program with high statistical significant difference where P = (0.000).

Table 5: Comparison within the study group according to Laboratory and radiological examination pre, and after 1 month of implementing health education program (n=49):

Items	**Study**				**Significance test**
	Pre (n=49)		**Post (n=49)**		
	No	**%**	**No**	**%**	
Hgb Low Normal	 36 13	 73.5% 26.5%	 44 5	 89.8% 10.2%	χ2 (4.356) p (0.037)*
Serum albumin Low Normal	 11 38	 22.4% 77.6%	 38 11	 77.6% 22.4%	χ2 (29.755) p (0.000)**
CT scan Normal Abnormal	 0 48	 0.0% 98.0%	 48 0	 98.0% 0.0%	χ2 (94.082) p (0.000)**
Ultrasound Normal Abnormal	 0 49	 0.0% 100.0%	 47 2	 95.9% 4.1%	χ2 (90.314) p (0.000)**
MRI Normal Abnormal	 1 47	 2.0% 95.9%	 47 1	 95.9% 2.0%	χ2 (88.167) p (0.000)**
Colonoscopy Normal Abnormal	 0 48	 0.0% 98.0%	 47 1	 95.9% 2.0%	χ2 (92.082) p (0.000)**
Barium enema Normal Abnormal	 1 44	 2.0% 89.8%	 43 2	 87.8% 4.1%	χ2 (78.439) p (0.000)**
ECG Normal Abnormal	 42 7	 85.7% 14.3%	 44 5	 89.8% 10.2%	χ2 (0.380) p (0.538)
Echo Normal Abnormal	 1 5	 2.0% 10.2%	 0 5	 0.0% 10.2%	χ2 (1.011) p (0.603)

It is apparent from table (5) that, there were highly statistical significant difference within the study group regarding serum albumin, hemoglobin, CT scan, ultrasound, MRI, colonoscopy and barium enema pre, and after one month of implementing health education program at p = **(0.000, 0.037, 0.000, 0.000, 0.000, 0.000 & 0.000)** respectively.

Table 6: Comparison within the study group regarding to total score of SF-36 domains HRQoL, pre and post implementation of health education program (n=49):

SF36Domains	Study		Significant test
	Pre (n=49)	Post (n=49)	
	Mean ± SD=	Mean ± SD=	
General health	3.88 ± 0.93 Min 3- Max 5	2.95 ± 0.68 Min 2- Max 5	t (14.63) p (0.000)**
Physical function	2.80 ± 0.40 Min 2- Max 3	1.51 ± 0.57 Min 1- Max 3	t (40.77) p (0.000)**
Role limitations due to physical health problem	1.92 ± 0.27 Min 1- Max 2	1.04 ± 0.19 Min 1- Max 2	t (38.30) p (0.000)**
Role limitations due to emotional problem	1.92 ± 0.27 Min 1- Max 2	1.03 ± 0.18 Min 1- Max 2	t (33.41) p (0.000)**
Social function	4.12 ± 0.90 Min 2- Max 5	2.83 ± 0.54 Min 2- Max 4	t (11.61) p (0.000)**
Bodily pain	4.55 ± 0.89 Min 2- Max 5	3.23 ± 0.73 Min 1- Max 5	t (10.80) p (0.000)**
Energy and fatigue	4.01 ± 1.30 Min 2- Max 6	4.42 ± 0.69 Min 2 - Max 6	t (3.66) p (0.000)**
Emotional well-being	3.82 ± 1.31 Min 2- Max 6	4.51 ± 0.73 Min 2- Max 6	t (6.45) p (0.000)**
Total	**3.26 ± 1.19 Min 1 - Max 6**	**2.57 ± 1.44 Min 1- Max 6**	**t (21.931) p (0.000)****

Table (6) illustrates that, the mean score of SF36 domains HRQoL within the study group pre and post-implementation of health education program were (3.88 ± 0.93 &2.95 ± 0.68) respectively regarding general health, (2.80 ± 0.40 &1.51 ± 0.57) respectively regarding physical function, (1.92 ± 0.27 & 1.04 ± 0.19) respectively regarding to role limitations due to physical health problem, (1.92 ± 0.27 &1.03 ± 0.18) respectively regarding to role limitations due to emotional problem, (4.12 ±0.90 & 2.83 ± 0.54) respectively regarding social function, (4.55 ± 0.89 & 3.23 ± 0.73) respectively regarding bodily pain , (4.01 ± 1.30 & 4.42 ± 0.69) respectively regarding energy fatigue and finally (3.82 ± 1.31 & 4.51 ± 0.73) respectively regarding emotional well-being statistically significant difference was high where P value = (0.000, 0.00, 0.000, 0.000, 0.000, 0.000, 0.000, 0.000) respectively. Regarding the total score of SF36 domains HRQOL, the table demonstrates that, the total mean score of the study group was (3.26 ± 1.19) post-implementation of health education program compared to (2.57 ± 1.44) pre-implementation of health education program with high statistical significant difference where P value = (0.000).

V. Discussion

Colorectal cancer represents 15% of worldwide malignancies; in men, it's the third cause of cancer and for women, it considered the second cause of cancer after breast cancer. Around one million new cases and 500000 deaths caused by CRC found worldwide every year [16].

As regards to age, the study in hand revealed that, the majority mean age were (46.31 ± 10.28 & 47.57 ± 11.70) in study and control group respectively in the age group (50 -59) years old. These findings come in accordance with **Gado et al., (2014)** [17] & **Zammit et al., (2011)** [18] who reported that, the majority of the studied subjects aged more than forty years old with the mean age (51 ± 15). These results may be due to the chronicity of the disease with this age. The result also comes in consistent with **Corley, et al., (2017)** [19], who mentioned that the incidence of CRC increases with age, in (50-60) years of age, according to the (United States Preventive Services Task Force), more than eighty percent of diagnosed cases of CRC occur in the age fifty five years.The findings disagreed with **Abou-Zeid et al., (2002)** [20], who mentioned that, the colorectal cancer had no tendency to a specific age group, thirty-eight percent of the tumors occurred in patients aged less than forty years, and only fifteen percent of patients were aged above sixty years according to Ain Shams data . **Downing, et al., (2015)** [21], also noted that, the mean respondent age was 67.4 years. While, **Tawk et al., (2015)** [22], come in contrast with the current result whose study noted that, study population was older (80.33% more than fifty years old). **Ali et al., (2017)** [23] & **Hokkam et al., (2013)** [24] also disagreed with the current findings who revealed that, the mean age of the studied elderly was (65.92±6.42 and 67.08±7.08) in the study and control group respectively in the age group (60 - 83) years old.

In relation to gender the study in hand represented that, the majority of the study group were male. This result supported by the study done by **Murphy et al., (2017)** [25] & **Siegel et al., (2017)** [26] who mentioned that the majority of the respondents were male as approximately thirty percent higher in men than in women. This may be due to exposures sex hormones and smoking. This findings also agree with **Majek et al., (2012)** [27], who noted that slightly more than half of the patients were males, and also agree with **Glaser et al., (2015)** [28], who

noted that, study population more in males than females were surveyed. The findings also come in contrast with a study done in England by **Downing, et al., (2015)** [21], who found that, 113 of 171 CRC survivors evaluated, were females.

Concerning the marital status the study in hand represented that, the majority of the study and control groups were married. This finding was supported by the finding of **Ali et al., (2017)** [23], & **Mayer et al., (2017)** [29], who reported that more than half of the study and control groups were married. The findings of the current study may be due to the majority of the study and control group were in the age more than 30 years old. Also this result agrees with **Tawk et al., (2015)** [22] & **Downing, et al., (2015)** [21], who noted that study population was married about (53.3%& 59%) respectively.

As regarded to education, the result of the present study showed that, the majority of the study group had secondary school. This agrees with **Davis et al., (2017)** [30], who mentioned that, the majority of the study subjects had diplomat degree. This also supported by **Downing, et al., (2015)** [21], who reported that, about forty six percent of 171 CRC survivors evaluated, had less than higher education.

In relation to occupation the finding of the present study represented that, more than half of patients have had moderate nature of work. These findings come in disagreed with **Gonzalez-Saenz et al., (2017)** [31] & **Downing, et al., (2015)** [21], who found that, the majority of the study was retired and didn't working.

Speaking of presence of the chronic diseases between the study and control group, the result showed that, the majority of the study and control groups had chronic diseases as hypertension and diabetes mellitus. These findings come in agree with **Cummings et al., (2017)** [32], who found that, the most common co-morbidities were high blood pressure. This chronic disease may be related to old age. These findings also agree with the study done in England by **Downing, et al., (2015)** [21], who noted that, more than half of respondents have been diagnosed with cardiac disease, DM and HTN.

Regarding to, smoking, the result of the current study clarified that more than half of the study wasn't smoked, this agree with **Davis et al., (2017)** [30], who mentioned that the majority of the study wasn't smoked.

The result also comes in consistent with **Brunet et al., (2017)** [33], who found that, the majority of study wasn't smoked while, about forty-five percent were currently smoked, after six weeks intervention program of CRC patients. Regarding to, family history, The result of the present study stated that, more than half of the study subjects had not family history, this agree with **Johnson et al., (2017)** [34],, who compared colonoscopic findings and withdrawal times between 2 groups of patients and found that the majority of the 2 groups had no family history of colorectal cancer, only hyperplastic polyps. These findings come in contrast with **Tsai et al., (2015)** [35], who reported that the majority of the study subjects had CRC family history and about half of them that of first-degree relatives aged fifty or older.

Concerning to the occurrence of complication after one month of operation, the current study revealed that the development of fever, wound infection and chest infection complications were equal in the study and control groups, these findings come in the same line with **Kirchhoff et al., (2010)** [36], who stated that, the most common surgical complications, affecting health outcomes, are wound infection (fever), bleeding, intra-abdominal, abscess anastomotic leakage, and ileus.

As regarding to laboratory investigation, the current study discriminates the study & control groups statistically related to serum albumin, elctrocardiogram and echocardiogram post-implementation of health education program compared to pre-implementation. These finding come in agree with **Chiang et al., (2017)** [37], who stated that, associations remained statistically significant difference between the two groups regarding to serum albumin in the patients with albumin levels <3.5 g/dL.

As regarding to general health dimensions of SF-36 domains, the current study argued that, the study & control groups were discriminated statistically post-implementation of general health perception dimensions of SF 36 domains compared to pre-implementation. These findings comes in accordance with **Hupkens et al., (2017)** [38], who measured that QoL and pelvic functional outcome were measured with the SF-36 health survey for colorectal cancer patients and stated that the study group reported significantly better general health compared with the control group.

As regarding to physical function of SF-36 domains, the current study disseminate that, there was statistically significant difference between the study & control groups post-implementation of physical function dimensions of SF-36 domains compared to pre-implementation. These findings comes in the same line with **Krouse et al., (2007)** [39], & **Hupkens et al., (2017)** **[38]**, who mentioned that physical QoL subscale was highly statistically significant differences for colorectal cancer patients postoperatively, with (P= 0.0008). While come in contrast with **Vallance et al., (2014)** [40], who reported that, a significant difference in HRQoL scores was detected in two groups (P =0 .038) for physical function, that did not associate with sedentary time with physical function statistically.

As regarding to role limitations due to physical health problems of SF-36 domains, the current study revealed that, there was statistically significant difference within the study group post-implementation of role limitations due to physical health problems dimensions of SF-36 domains compared to pre-implementation.

These findings come in the same line with **Moseholm et al., (2017)** [41], who mentioned that qualitative study elucidated HRQoL in diagnostic phase. Definitely, HRQoL domains affected the respondents, and statistically significant differences of studied sample regarding to role limitations due to physical health problem.

As regarding to role limitations due to emotional problems of SF-36 domains, the current study showed that, there was statistically significant difference within the study group post-implementation of role limitations due to emotional problems dimensions of SF-36 domains compared to pre-implementation. The finding reflects that the work status of patient post implementation has been affected due to physical function and has been affected due emotional function. These findings comes in accordance with **Moseholm et al., (2017)** [41], who found that statistically significant differences of studied sample regarding to role limitations due to emotional problems.

As regarding to social function of SF-36 domains, the current study showed that, there was statistically significant difference between the study and control groups post-implementation of social function dimensions of SF-36 domains compared to pre- implementation, these results agree with **Costa et al., (2017)** [42], who stated that social support had positively correlated with QoL (i.e., social, physical, and emotional) and found that statistically significant difference to social function dimensions through Brazilian ambulatory oncological clinic carried out cross-sectional study (144 respondents of CRC).

As regarding to bodily pain (pain intensity) of SF-36 domains, the study in hand elucidated statistically significant difference among the study and control groups post-implementation of bodily pain dimensions of SF-36 domains compared to pre-implementation. This agreed with **Hisae et al., (2016)** [43], & **Weeks et al., (2002)** [44], whose study compared short-term QoL outcomes after laparoscopy-assisted colectomy (LAC) versus colon surgery for CRC and found that, statistically significant differences were noticed among groups was the global rating scale score for two weeks post-surgery regarding to pain intensity.

As regarding to energy and fatigue of SF-36 domains, the current study showed that, there was a statistically significant difference within the study group post- implementation of energy and fatigue dimensions of SF-36 domains compared to pre- implementation. These findings come in agree with **Costa et al., (2017)** [42], who found that a highly statistically significant difference in study group regarding to energy and fatigue dimensions of SF-36 domains compared to control group post implementation of rehabilitation program among colorectal cancer patients undergoing surgery. These findings come in contrast with **Vallance et al., (2014)** [41], whose study reported that, didn't associate with sedentary time with fatigue dimension between two groups statistically. Regarding to, emotional well-being of SF-36 domains, the current study elucidated statistically significant difference among the study and control groups post-implementation of emotional well-being dimensions of SF-36 domains compared to pre-implementation. This agree with **Hupkens et al., (2017)** [38], who reported statistically significant differences regarding emotional dimension ($p = 0.003$) compared to control group, according to the SF-36 questionnaire. On the other hand, the findings come in contrast with **Vallance et al., (2014)** [41], who reported that, didn't associate with sedentary time with HRQoL, emotional well-being between two groups statistically.

As regarding to total score of SF-36 domains, the current study revealed that, there was statistically significant differences between the study & control groups related to total mean score of SF-36 domains HRQoL post- implementation of SF-36 domains compared to pre-implementation, which reflect an improvement of HRQoL which, may be attributed to the effect of implementation of health education program. The findings come in the same line with **Mayer et al., (2017)** [29] & **Rattanajarana, (2005)** [45], who showed that, the presence of satisfaction with HRQoL, that the presence of positive influence of rehabilitation program on HRQoL among CRC undergoing surgery.

On the other hand, the findings disagree with **Brunet et al., (2017)** [33], who found that, regarding to QoL, there was no proof that variation in pain, fatigue, mental health perceptions, insomnia and physical health perceptions, with $p = (0.67, 0.10, 0.90, 0.89, 0.34,)$ respectively, observed from before & after intervention program and there was not statistically significant difference among intervention group & control group. That reflects the presence of negative influence of rehabilitation program on HRQoL among colorectal cancer patients undergoing surgery.

VI. Conclusion

The findings of the present study concluded that, the study group showed an improvement in their health outcomes post- implementation of health education program compared to control group.

VII. Limitations

Firstly, Lack of suitable place for interviewing patients and performing the program. Secondary inability to provide follow up for some patients due to death, chemotherapy and radiotherapy side effect. Finally, a short period of follow-up considers another limitation for this study. A key advantage of this study over previous studies includes the use of more than one tool to objectively assess patients' outcomes.

VIII. Recommendation

1. All patients scheduled for colectomy and their families are in need to an adequate knowledge and skill to help them to adapt with their life after operation.
2. Establishment of a web site, including all information pertained to colectomy process and all aspects of health education such as different educational materials, Medias and audio- visual aids.
3. Psychological rehabilitation program should be held to meet the colorectal cancer patient's needs.
4. National strategies are highly required to support colorectal cancer patients and their families.
5. Provision of seminars to raise health team personnel awareness about benefits of colorectal cancer patient's education for their provision of care.
6. Application of the study on a large probability sample selected from different geographical area to obtain generalized data.
7. Further studies have to be carried out in order to assess nurse's knowledge and practices regarding care of colorectal cancer patients.

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