

## The Effect of Yoga on Life Satisfaction and Depression in Patients Undergoing Colorectal Cancer Surgery

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### Abstract

**Background:** Colorectal cancer is one of the most important causes of morbidity and mortality throughout the world. Depression is one of the most common mental disorders in cancer patients. Because cancer patients can experience depression their life satisfaction decreases.

**Objectives:** The aim of this study is to determine the effect of yoga on life satisfaction and depression in patients undergoing colorectal cancer surgery.

**Method:** This study is a nonrandomised controlled trial. The study took place at the general surgery clinics of a university and public hospital in Turkey. A total of 110 adult patients (55 experimental-55 control) were selected by the nonprobability sampling method for the study. The experimental group did 30 minutes yoga, every weekday for three weeks. Patient-Description Form (PDF), Satisfaction With Life Scale (SWLS), Beck Depression Inventory (BDI) were applied as a pre-test to the patients in the experimental and control group on the second day after surgery. SWLS and BDI was applied as the post-test in the day after the yoga was completed. SWLS and BDI was again filled to the patients in the control group three weeks after from pre-test.

**Results:** The SWLS pre-test score of the experimental group was  $8.74 \pm 1.72$ , the score of the post-test was  $28.43 \pm 6.27$ ; the pre-test score of the BDI was  $50.85 \pm 4.70$ , the post-test score was  $17.16 \pm 10.47$ . The SWLS pre-test score of the control group was  $13.30 \pm 1.74$ , the score of the post-test was  $14.49 \pm 2.73$ ; the pre-test score of the BDI was  $46.36 \pm 2.88$ , the post-test score was  $44.38 \pm 5.07$ . Differences between experimental and control group were found to be significant ( $p < 0.05$ ).

**Conclusion:** In patients undergoing colorectal cancer surgery, yoga was determined to increase life satisfaction and reduce the level of depression. It may be advisable to use yoga as a complementary method to increase the effectiveness of treatment in nursing practices.

**Keywords:** Cancer, Depression, Life satisfaction, Yoga, Nursing

### 1. INTRODUCTION

Cancer is one of the most important health problems due to its frequent occurrence in both Turkey and the World. According to Global Burden of Cancer Study 2018 data published by International Agency for Research on Cancer, colorectal cancer is the third most common cancer in men all over the world, while it ranks second in women (Bray et al., 2018; Ferlay et al., 2019). Colorectal cancer deaths explain 9.2% of all cancer deaths. (Bray et al., 2018; World Health Organization (WHO, 2018) In Turkey, colorectal cancers are among the top five most common cancers in men and women. According to 2016 data of the Ministry of Health, it ranks third in men and women among the cancers in Turkey. (T.C Ministry of Health Public Health Agency of Turkey, 2016)

The incidence of depression, which is one of the most common mental disorders in cancer patients, was reported as 77 % (Vlad-Andrei & Enache, 2020). Akyol et al (2015) detected that 44% of patients were depressed in their study on patients with colorectal cancer. The deterioration in body perception and decreased self-esteem in patients with colostomy cause many mental health problems, especially depression (Marković & Miloš, 2017).

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Because cancer patients can experience psychological problems such as depression and anxiety, their quality of life is negatively affected, and their life satisfaction decreases. Life satisfaction is the cognitive component of subjective well-being, and it includes comparisons of the expectations of the individual's own life and their living conditions, thus evaluation of their own life (Folker, Hegelund, Mortensen, Wimmelmann, & Flensburg-Madsen, 2019; Kugbey, Meyer-Weitz, & Asante, 2019). Graham et al (2017) determined that the levels of life satisfaction of colorectal cancer patients were low (Graham, Spiliopoulou, Arbuckle, Bridge, & Cassidy, 2017). Cancer patients with high levels of depression were found to have a lower level of life satisfaction (Folker et al., 2019).

Yoga has benefits such as eliminating accumulated toxins, speeding up metabolism, regulating the functioning of the systems, eliminating physical tension, stress and depression (Butera & Elgelid, 2017; Field, 2016; Moonaz & Byron, 2018). McCall et al (2015) determined that yoga practiced by cancer patients improved patient compliance, also increased the health of physical, psychological and social interaction from the sub-dimensions quality of life (McCall, McDonald, Thorne, Ward, & Heneghan, 2015).

There are very few studies conducted in patients with colorectal cancer. So the aim of the study was to explore whether yoga could increase life satisfaction and reduce the level of depression in patients undergoing colorectal cancer surgery?

## **2. MATERIALS AND METHODS**

### **2.1. Study design**

This study was conducted in the general surgery clinics of a university hospital and public hospital between May 2016-December 2017 in eastern Turkey as a nonrandomised controlled trial, which was designed according to a quasi-experimental model.

All adult patients undergoing colorectal cancer surgery at the general surgery clinics during June 2016 - June 2017 were offered the opportunity to take part in the trial. In the general surgery clinics, only medical treatment is routinely provided. For patients undergoing colorectal cancer surgery, yoga is not part of routine care.

In the power analysis conducted to determine the sample of the study, the sample size was determined as 110 patients (55 experimental and 55 control groups) with significance level of 0.05, effect size of 0.07, and the ability to represent the population with the rate of 0.95. The patients were selected by using the nonprobability sampling method. Firstly the experimental group and then the control group patients were included in the study. There were no patients who left the study during the intervention, and the study was completed by 110 patients.

Inclusion criteria were as follows: Patients able to communicate, who had not been diagnosed with psychiatric illnesses, and who agreed to participate in the study.

### **2.2. Data Collection**

The data was collected by the researcher in the general surgery clinics for 12 months. Patient-Description Form, Satisfaction With Life Scale, Beck Depression Inventory were applied as a pre-test to the patients in the experimental group on the second day after surgery. After the pre-test, the experimental group did 30 minutes of yoga (breathing exercises), which was practiced by the researcher. Yoga (breathing exercises) was performed every weekday for three weeks. The Satisfaction With Life Scale, Beck Depression Inventory was applied as the post-test in the day after the intervention was completed. Patient-Description Form, Satisfaction With Life Scale, Beck Depression Inventory was filled as pre-test by the researcher and patients in the control group at the clinic on the second day after the surgery, and no intervention was made. Post-test was performed after three weeks. The answers of patients were filled by the researcher by marking the forms.

#### **2.2.1. Patient-Description Form**

This form was prepared to determine the descriptive characteristics of the patients included in the study. Patients' age, sex, marital status, education level, types of surgery, colostomy operation, cancer stage, metastasis, disease other than cancer. Descriptive information were collected from the patients and their files.

#### **2.2.2. Satisfaction with Life Scale**

This scale was developed by Diener et al in 1985 to determine the life satisfaction of individuals. Diener et al (1985) found the cronbach alpha coefficient of the scale as 0.87 in the original study Köker (1991) made the adaptation of the scale to Turkish, and the cronbach alpha coefficient was found as 0.85 (Köker, 1991). In the present study, the cronbach alpha coefficient of the scale was found to be 0.67. It is the five points likert scale with seven degrees. Each item is rated between 1-7 and the lowest score is obtained as 5, the highest score is 35, and the higher the point of the scale points that the life satisfaction is high (Diener et al., 1985; Köker, 1991).

### 2.2.3. Beck Depression Inventory

The inventory was developed by Beck et al in 1961 and the cronbach alpha coefficient was found to be 0.86 . The validity and reliability study in Turkey was made by Hisli in 1989 and the cronbach alpha coefficient was found to be 0.74. In the present study, the cronbach alpha coefficient of the scale was 0.53. With the inventory, the somatic, emotional, cognitive, and motivational symptoms, especially the cognitive content, are measured in depression, not the etiology of depression is investigated. The inventory consists of 21 items, each with 4 self-assessment statements. The number that is written next to each item (between 0 and 3) shows the score to be given to that item. Points that can be gained from the scale are in the range of 0-63. The high overall score shows the highness of depression or the severity (Beck et al., 1961; Hisli, 1989).

### 2.3. Intervention for Experimental Group

Prior to starting yoga practice, the researcher received 10 hours of theoretical and 40 hours of practice training in the yoga course on breathing techniques and simple yoga techniques. The patients in the experimental group were informed about yoga and the aim and method of the study were explained, and their consent was received. In cases that prevented them from performing yoga, such as pain and reluctance, the session of the day was postponed. Yoga practice was done with the researcher during the morning in the patient's own room with natural light by the window while lying on the bed in a quiet environment.

During yoga breathing exercise, the lungs were emptied for each technique. Then a deep breath was taken according to the technique and after holding the breath for 3 seconds, the lungs were completely emptied by giving breath. The application was first started with abdominal breathing, followed by chest breathing, shoulder breathing, full breathing technique, breathing technique through different nostrils in order, and finally deep relaxation technique (yoga nidra). The time was set for each of the yoga breathing techniques. Abdominal breathing - 3 minute. Chest breathing - 3 minutes. Shoulder breathing - 3 minutes. Full breathing technique - 3 minutes. Breathing technique through different nostrils in order- 3 minutes. Finally deep relaxation technique (yoga nidra) - 15 minutes.

Abdominal breathing from the techniques used in yoga (pranayama); to control the breath, the hands should be placed on the end of the rib cage, on the abdomen. When breathing, the abdomen inflates, enlarges, and the diaphragm goes down to allow to massage the internal organs. In this way, the lower part of the lungs is filled with air. When breathing, the abdomen is pulled inwards, shrinking and the diaphragm is raised up to allow to massage the heart, while the lower part of the lungs is completely discharged.

Chest breathing; When applying this breathing technique, the hands should be placed on the chest reciprocally or upside-down to control the breath. When breathing, the central part of the lungs is filled with air and the rib cage is inflated. When exhaling, the rib cage is lowered and the middle part of the lungs is emptied. With this technique, the pumping power of the heart increases thanks to this movement in the rib cage.

Shoulder breathing; The hands are placed over the shoulders and the shoulders should be raised while breathing so that the upper part of the lungs is filled with air. The shoulders are raised until the hands touch the ears. While exhaling, the shoulders are lowered and the arms touch both sides so that the air at the top of the lungs is completely discharged. With shoulder breathing, the upper part of the lungs become active and the accumulated toxins are discharged.

Full breathing technique; Thanks to this technique, the lungs work at full capacity. Full breathing method is to perform abdominal, chest and shoulder breathing techniques in order. When breathing, the abdomen is inflated, the chest is enlarged, and the shoulders are raised. Thanks to this technique, the lungs are completely filled with air. While exhaling, the abdomen is drawn inwards and the rib cage descends, emptying the lower and middle parts of the lungs. Then the shoulders are lowered and the lungs are completely emptied.

Immediately afterward, the breathing technique through different nostrils sequentially is applied; Person should be seated with his/her back in a vertical position. If the person can sit comfortably on the floor, he/she can sit on cross-legged, on the knees or sit on the chair. The important thing is to sit comfortably and the back area should be up straight. The left hand should be in the position of Jnana Mudra that is, the tips of the thumb and index finger are touched to each other, and the other 3 fingers remain open. Hands are placed on the knees. The index finger of the right hand is placed on the forehead and the right nostril is closed with the right thumb. Other fingers should be closed. A long and deep breath is taken slowly through the left nostril. The left nostril is closed with the middle or ring finger of the right hand, the right thumb is pulled from the right nostril and breath is given from the right nostril. Then, a long and deep breath from the right nostril is taken again, the right nostril is closed again with the right thumb, the left nostril is opened and the breath is slowly given from there. Again, breath is taken through the left nostril and given through the right nostril. It is repeated several times in sequence.

The deep relaxation technique (Yoga Nidra); Yoga Nidra requires a Shavasana position, feet should be open 40 centimeters (cm) and person should lie on their back. The spine should be straight. The arms are extended to the sides with the palms facing upwards. The person can be covered with a blanket. The body should be relaxed by focusing on the region by region. This deep relaxation technique is usually applied upwards starting from the foot. In this way, each part of the body is contracted one by one, then relaxed, lifted and then released slowly. With this application, yoga practice was terminated. Each session of yoga lasted approximately 30 minutes.

#### 2.4. Data Analysis

The data was encoded by the researcher and analyzed using SPSS 22 statistical package software (Statistical Package for Social Sciences, SPSS Inc., Chicago, IL, USA). Descriptive statistics, chi-squared values, t-test, correlation analysis were used. Significance level was 0.05.

#### 2.5. Ethical Principles of the Study

Prior to the study, written permission was obtained from the Ethics Committee of Non-Interventional Research at Firat University (Decision No: 2016 / 11-17) and from the hospitals. In addition, the patients and relatives were informed about the study. Patients were told that their personal information would be kept confidential and that they could leave work at any time they wish. Volunteers were included in the study.

### 3. RESULTS

The mean age of the experimental group was  $61.07 \pm 11.54$ , 67.3% of them were male, 94.5% were married, 60.0% had primary school degree, 30.9% had low anterior resection as a surgical intervention, 56.4% had colostomy, and 49.1% had stage-3 cancer, 89.1% had metastases to lymph and/or liver, and 49.1% had no other disease other than cancer (Table 1). When the control group was examined, the mean age was  $56.98 \pm 16.23$ , 58.2% were male, 78.2% were married, 40.0% had primary school degree, 29.1% had low anterior resection, 54.5% had colostomy, 45.5% had stage-3 cancer, 74.5% had metastases to lymph and/or liver, 63.6% had no other disease other than cancer (Table 1).

There is significant difference in terms of only marital status from the descriptive characteristics of patients between the experiment and control groups ( $p < 0.05$ ), there is no difference in terms of gender of patients, level of education, type of surgery, presence of colostomy, stage of cancer, metastasis, the presence of the disease other than cancer ( $p > 0.05$ , Table 1). The SWLS pre-test scores of the experimental group patients were lower than the scores of the control group patients, and the BDI pre-test scores were higher than the control group patients' scores. When the SWLS and BDI pre-tests and post-tests average scores were examined, the difference between the experimental and control groups was statistically significant ( $p < 0.05$ , Table 2).

When we examined the relationship between the SWLS and BDI pre-test and post-test scores of patients in the experimental group, we found that the significant negative relationship between them increased from weak to moderate. ( $p < 0.05$ , Table 3). As life satisfaction increased, depression was reduced.

### 4. DISCUSSION

Colorectal cancers, especially after colostomy, cause a change in body image, decrease in self-esteem and social isolation, which increases the susceptibility of patients to depression and reduces life satisfaction (Marković & Miloš, 2017; Tung et al., 2016).

This study determined that life satisfaction was low during the pre-test evaluation of the patients in both the experimental and the control group. It can be said that the low life satisfaction of patients with colorectal cancer is due to the increased pessimistic thoughts from the moment the patients were diagnosed with cancer and due to the destroyed expectations and hopes for life (McCall, McDonald, et al., 2015; Pasyar, Tashnizi, Mansouri, & Tahmasebi, 2019; Rahmani & Talepasand, 2015). Experimental and control group patients were seen to have high levels of pre-test depression. In patients with ostomy due to colorectal cancer, the change in body perception and decreased self-esteem are expected. It is obvious that the high level of depression in patients is caused by this situation.

In the study, the low life satisfaction of patients in the experimental group was increased after the practice of yoga, and this situation was statistically significant (Table 2). Because of the positive effects of yoga, such as soothing the mind, changing negative emotions, creating a positive perspective towards life, increasing inner peace, the satisfaction of life increases as a result of the increasing quality of life (Butera & Elgelid, 2017; Field, 2016; Moonaz & Byron, 2018).

In studies conducted in cancer patients, yoga has been determined to improve the quality of life (McCall, McDonald, et al., 2015; Pasyar et al., 2019; Rahmani & Talepasand, 2015). In contrast to this study results, Cramer et al (2016) in a randomized study in patients with colorectal cancer, found that yoga had no effect on the quality of life .

The mental benefits of yoga decrease tension, stress, and depression. The yoga practice, especially in cancer patients, was reported to decrease depression (McCall, Thorne, Ward, & Heneghan, 2015; Moonaz & Byron, 2018). The results of this study were similar to the literature, and it was found that the depression level in the experimental group decreased after yoga application and this was statistically significant (Table 2). Similarly to the literature and the present study, (Rao et al., 2015) found that yoga reduced depression in patients with cancer. Bridges L, Sharma M. (2017) investigated the effects of yoga on cancer patients and found that depression decreased in patients performing yoga. In other similar studies, yoga reduced depression in patients with cancer (Cramer et al., 2017; Danhauer, Addington, Sohl, Chaoul, & Cohen, 2017; Vadiraja et al., 2017).

The present study determined that the life satisfaction of the patients in the control group was slightly elevated in the post-test, while depression levels decreased, and this situation was statistically significant (Table 2). In the literature, it is stated that in patients with colorectal cancer, the improvement of life satisfaction and decrease in depression levels may be associated with the recovery process and the exposure of pre-test (Cramer et al., 2016). In this context, the reason for the increase in life satisfaction and decrease in depression levels in the post-test evaluation of patients in the control group 3 weeks after pre-test is that, the symptoms of the disease decreased, self-care was achieved, expectations of life increased, patients felt better with the second visit of the researcher, and their confidence in the researcher increased with the time elapsed.

Some studies in the literature reported that depression reduces life satisfaction (Folker et al., 2019; Vlad-Andrei & Enache, 2020).The present study found that depression levels decreased as the life satisfaction of the patients in the experimental group increased, and the negative relationship between them was found as statistically significant (Table 3). These findings support the literature knowledge. Likewise, Graham et al (2017) found that life satisfaction decreases as depression increases in patients with colorectal cancer (Graham et al., 2017). Similarly, in a study on patients with colorectal cancer Beak and Yi (2015) found that the quality of life decreased significantly as depression increased (Baek & Yi, 2015). In a study on patients with colorectal cancer, Mols et al(2018) found that the quality of life in patients with depression is lower than those of patients who are not depressed(Mols, Schoormans, de Hingh, Oerlemans, & Husson, 2018). Yağlı et al(2015) found that the level of depression decreased as the quality of life increased in patients with other type cancers . In this study, the negative relationship between life satisfaction and depression levels of patients increased from weak to intermediate level after a yoga practice, showing the benefits of this application on patients. After the practice of yoga, patients' life satisfaction increased more and depression levels were less than the level of the pre-test. This result confirms the research hypothesis that yoga increases life satisfaction and reduces the level of depression in patients undergoing colorectal cancer surgery.

The use of the nonprobability sampling method in the study constitutes the limitation of the study. The results of the study can only be generalized to this group. Because yoga practice in patients with colorectal cancer is an under-studied topic, the findings of this study were compared with other studies in cancer patients (colorectal, stomach, lung, breast cancer patients).

## **5. CONCLUSION**

The study found yoga to be an effective method that reduced the level of depression, increased life satisfaction. These findings support the implementation of yoga as an independent nursing intervention to raise life satisfaction and to reduce depression levels in patients undergoing colorectal cancer surgery. As a complementary therapy, yoga can be a useful method for surgical nurses to increase the life satisfaction in patients undergoing colorectal cancer surgery, as it helps to create breath awareness, relax, supporting individuals with the inner satisfaction.

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## **CONFLICTS OF INTEREST**

The authors have no conflict of interest to declare.

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**Table 1.** Descriptive Characteristics of the Experimental and Control Groups

Characteristics	Experimental Group (n = 55)		Control Group (n = 55)		P Value
Age	Mean ± SD		Mean ± SD		.131
	61.07 ± 11.54		56.98 ± 16.23		
	n	%	n	%	
<b>Gender</b>					
Male	37	67.3	32	58.2	.324
Female	18	32.7	23	41.8	
<b>Marital status</b>					
Married	52	94.5	43	78.2	<b>.012</b>
Single	3	5.5	12	21.8	
<b>Level of education</b>					
Illiterate	7	12.7	14	25.5	.170
Primary school	33	60.0	22	40.0	
High school	9	16.4	11	20.0	
University	6	10.9	8	14.5	
<b>Type of surgery</b>					
Total colectomy	3	5.5	10	18.2	.304
Subtotal colectomy	13	23.6	10	18.2	
Low anterior resection	17	30.9	16	29.1	
Hemicolectomy	16	29.1	12	21.8	
Other (Transverse colectomy, abdominoperineal resection, sigmoidectomy)	6	10.9	7	12.7	
<b>Colostomy</b>					
Yes	31	56.4	25	45.5	.252
None	24	43.6	30	54.5	
<b>Cancer stage</b>					
Stage 1	1	1.8	1	1.8	.580
Stage 2	5	9.1	10	18.2	
Stage 3	27	49.1	25	45.5	
Stage 4	22	40.0	19	34.5	
<b>Metastasis status</b>					
Lymph and/or liver	49	89.1	41	74.5	.124
Other (lung, stomach)	2	3.6	3	5.5	

None	4	7.3	11	20.0	
<b>Presence of other diseases</b>					
Diseases of the cardiovascular system	16	29.1	10	18.2	.451
Endocrine system diseases	10	18.2	8	14.5	
Respiratory system diseases	2	3.6	2	3.6	
None	27	49.1	35	63.6	

Abbreviations: SD, standard deviation.

**Table 2.** Comparison of SWLS and BDI Pre-Test and Post-Test Scores of the Experimental and Control Group Patients

Scale	Experimental Group ( <i>n</i> = 55) Mean ± SD	Control Group ( <i>n</i> = 55) Mean ± SD	P Value
SWLS pre-test	8.74 ± 1.72	13.30 ± 1.74	.000
SWLS post-test	28.43 ± 6.27	14.49 ± 2.73	.000
<b>P Value</b>	<b>.000</b>	<b>.006</b>	
BDI pre-test	50.85 ± 4.70	46.36 ± 2.88	.000
BDI post-test	17.16 ± 10.47	44.38 ± 5.07	.000
<b>P Value</b>	<b>.000</b>	<b>.014</b>	

Abbreviations: SD, standard deviation; SWLS, satisfaction with life scale; BDI, beck depression inventory

**Table 3.** Examination of the Relationship between the SWLS and BDI Pre-Test and Post-Test Scores of the Patients in the Experimental Group

Scale	<i>n</i>	<i>r</i> Value	P Value
<b>SWLS-BDI pre-test</b>	55	-0.356	<b>.008</b>
<b>SWLS-BDI post-test</b>	55	-0.688	<b>.000</b>

Abbreviations: SWLS, satisfaction with life scale; BDI, beck depression inventory