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ASSOCIATION BETWEEN NUTRITIONAL STATUS, OSTOMY TIME AND QUALITY OF
LIFE IN PATIENTS WITH COLORECTAL CANCER

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Association between nutritional status, ostomy time and quality of life in patients with colorectal cancer

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SUMMARY

Background: Ostomy may be necessary for the patient who performs bowel resection, but it could influence the nutritional status and quality of life (QoL). The aim of this study was to evaluate the influence of ostomy time and nutritional status on QoL.

Methods: Cross-sectional was performed with 66 patients ostomized by colorectal cancer in a reference service. Socioeconomic, demographic, anthropometric QoL were obtained. Other clinical and surgical data were registered from the clinical records. The anthropometric data were weight and height, with these data the Body Mass Index (BMI) was analyzed. To evaluate the QoL, the European Organization for Research and Treatment of Cancer questionnaire EORTC-QLQ-C30 and EORTC-QLQ-CR29 were used. Statistical significance analysis was performed using the analysis of variance or chi-square test.

Results: Of 66 individuals, 51,5% were male, 75,8% had 55 years of age or older, 56.3% have ostomy for less than 1 year. Over half of the patients had some nutritional status inadequacy: 23.4%

were underweight, 20.3% overweight and 9.45% obese. The higher ostomy time and the malnutrition influence the QoL in patients with colorectal cancer. The under ostomy time was associated with difficult financial domain ($p=0.045$) and the higher ostomy time with urinary incontinence ($p=0.046$) while the malnutrition was associated with sleep disturbance ($p=0.019$), abdominal pain domains (p value = 0.028), bloating ($p=0.011$), concern about weight ($p=0.002$) and female sexual interest (p value = 0.038).

Conclusions: The current study revealed that the ostomy time and nutritional status influence in the QoL in patients with colorectal cancer in postoperative ostomy.

Key-words: cancer colorectal, ostomy, nutritional status, quality of life.

1. Introduction

Colorectal cancer affects the colon and/or rectum and can be caused by dietary habits, alcohol consumption, smoked, genetic background, polyposis, intestinal diseases, among other factors (1). The colorectal cancer show a high frequency in the world and Brazil. According global cancer statistics, in 2012 the frequency of colorectal cancer was 10% and the third more frequently in male and the second in female (2). In 2013, 15.415 people died of colorectal cancer in Brazil. The estimate for 2018 is that 17,380 new cases in men and 18,980 in women are diagnosed in the country (3). The complication most frequently found in cancer patients is malnutrition, which usually have weight loss, weakness, lack of appetite and early satiety (4). Another factor that affects these individuals is the poorer QoL, which is fundamental for better treatment and survival (5).

Some patients need to perform a surgical procedure to remove parts of the bowel affected by cancer, with this there is need for colostomy, performed through a surgical process connecting the colon to the abdomen, may be temporary or definitive (6,7). No statistical data were found on how many stomas are definitive, but Ramos and cols in their study concluded that 83% of patients seen in a reference unit in high and medium complexity habilitation in Rio de Janeiro had definitive colostomies due to colorectal cancer (8). According to Fortes and cols, temporary and permanent colostomy cause the same impact on QoL (9). In addition, such a procedure can lead to a series of complications, among which, water losses and hydroelectrolytic disorders, requiring strict monitoring to avoid malnutrition (7).

The malnutrition is known in cancer patients and it is widely reported in literature, but for the our best knowledge, there was a study that analyzed the nutrition status by biochemical levels and the QoL (10). So, no studies were found to directly relate QoL to nutritional status by a stronger instrument, such as body mass index. In addition to physiological changes, when passing through the stoma, the patient undergoes emotional and social changes, such as self- esteem, body image and sexuality. This process has great impact on the patient, who needs to deal with apparent stool, odor, leakage of feces, intestinal discomforts, diarrhea, wounds, can generate socialization difficulties for this individual. Because of this he is not accepting himself, have difficulty adapting to this new condition and to reintegrate into social activities (11). Few studies relate the time of ostomy to the QoL but using different instruments.

There are articles that address the QoL of these individuals, but few use the EORTC- QLQ- CR29 instrument, since it is more recent, which is an update of the EORTC-QLQ-CR38, widely discussed in the literature. EORTC-QLQ-CR29 is a validated questionnaire for patients with colorectal cancer and should always be used with EORTC-QLQ-C30, a questionnaire for cancer patients. Therefore, the aim of this study was to evaluate the influence of nutritional status and ostomy time on QoL.

2. Methods

2.1. Study design and data collect

2.1.1. Patients

Cross-sectional study was performed with 66 patients ostomized by colorectal cancer in a Universitary Hospital from August 2017 to February 2018. Patients with a diagnosis of previous major depression, neuropsychopathies or other serious mental or cognitive disorders diagnosed previously by a health team or that had other chronic diseases that required intense food modifications were excluded from the study.

This study was approved by the Ethics Committee of the Universidade Federal de Uberlândia (CAAE 65975817.6.0000.5152).

2.2. Methods

Patients are received and monitored at the outpatient clinic and the sample calculation was done based on this number of individuals. The sample error of 5% was used to calculate the first approximation of the sample size that together with the population size it was possible to calculate the sample size of 59 individuals (12). Patients included and excluded from the research are described in Figure 1.

Figure 1

Clinic data were collected regarding physical and virtual medical record surgery as the date of diagnosis, date of resection and ostomy procedure, size of intestinal resection. Patients were asked about sociodemographic data such as ethnicity, schooling and income. Patients' weight was measured on a Welmy® mechanical scale, with the patient positioned standing in the center of the scale, barefoot, wearing light clothing, reading in the nearest 0.1 kilo (13). The height was determined in a stadiometer coupled to the scale, with the patient standing, barefoot, on a fixed platform, with his back to the marker, with united feet, in a straight position, with the eyes facing forward, in the plane of Frankfurt, realizing the height in the nearest 0.1 centimeter (13). To calculate the nutritional status, the BMI, calculated from body weight (kg) divided by the square of height (m), following WHO reference values for adults [kg/m^2 (<18,5 low weight; $\leq 18,5$ - <25 eutrophic; ≤ 25 - <30 overweight; ≥ 30 obesity)] and PAHO for the elderly [kg/m^2 (<23,0 low weight; 23 - <28 eutrophic; ≥ 28 - <30 overweight; ≥ 30 obesity)] (14,15).

EORTC-QLQ-C30 version 3.0 and EORTC-QLQ-CR29 were used to assess QoL, authorized for use by the European Organization for Research and Treatment of Cancer (EORTC). The EORTC-QLQ-C30 version 3.0 is a questionnaire for cancer patients and consists of 30 questions, which are divided by scales, being 6 of function (physical, emotional, cognitive, social, role performance, overall health and QoL); 3 of symptoms (fatigue, pain and nausea and vomiting); and 6 unique items (symptoms and financial impact of the disease). EORTC-QLQ-CR29 is a questionnaire for ostomized colorectal cancer patients or not, contains 29 questions and should always be applied to EORTC-QLQ-C30, the first one was used. It contains 4 scales: urinary frequency, blood and mucus in stool, stool frequency and body image; plus 19 unique items. All scores were calculated according to the EORTC-QLQ-C30 Scoring Manual, which contains summary information about supplementary modules.

2.3. Statistical analysis

The database containing the application information was entered and analyzed in the Statistical System Software Package 20.0 for Windows (SPSS, 2011). The distribution of the variables was analyzed by the Kolmogorov-Smirnov tests. The descriptive analysis was performed through mean and median (minimum-maximum) for quantitative variables and by proportion to qualitative variables. Statistical significance analysis was performed using the analysis of variance ANOVA for quantitative variables and by the chi-square test for qualitative variables.

3. Results

Of 66 patients, there were 51,5% males, 30.3% had between 55 and 65 years and 63.6% classified themselves like non-white. The sample showed lower education and income, 54.5% had less than nine years of study and 34.4% receive between \$294 and \$589. Almost forty percent had diagnosis time of ostomy less than 12 months and 56.3% had ostomy time less also less than 12 months. Systemic arterial hypertension and diabetes were more frequently comorbidities 40.9% and 22.7%, respectively. Finally, 23,4% were malnourished and 29,7% were overweight or obesity (Table 1).

Table 1

An association was found only between the higher time of diagnosis and higher the time of ostomy and between the under time of diagnosis and the malnutrition. There were no statistically significant differences for the other variables.

Table 2

Considering the QoL (EORTC-QLQ-C30), (Table 2), the under time of ostomy (<12 months) was associated with financial difficulties (mean 36.03), than more a year of surgery (mean 17.94 for 1 to 2 years; mean 10.41 for >2 years). Besides that, the malnourished shoed a higher score to sleep disturbance (mean 48.71) than wellnourished (mean 26.26). For the domains of EORTC-QLQ-CR29, individuals ostomized for longer time (≥ 12 months) had more urinary incontinence (mean 12.82 for 1 to 2 years; mean 12.50 for >2 years). Abdominal pain and swollen belly were also associated with nutritional status, having a higher score among the malnourished,

35.89 and 38.46, respectively. Concern about weight was significant when related to nutritional status, affecting the malnourished as expected (mean 48.71). Finally, the interest sexual intercourse was associated with nutritional status in women being that undernourished women showed less interest, with a mean score of 11.11 among them.

4. Discussion

In the present study, the under ostomy time and the malnutrition influence the QoL in patients with colorectal cancer. The higher ostomy time (>2 years) was associated with difficult financial domain ($p=0.045$) and with urinary incontinence ($p=0.046$) while the malnutrition was associated with sleep disturbance ($p=0.019$), abdominal pain domains (p value = 0.028), bloating ($p=0.011$), concern about weight ($p=0.002$) and female sexual interest (p value = 0.038). There are studies that evaluate nutritional status and QoL in patients ostomized due to colorectal cancer, such as Fortes and cols (16), however, they mostly make separate evaluations just with QoL and do not relate to ostomy time, as Ferreira and cols (17), Lin and cols (18), Peng and cols (19). And some studies that use other methods to assess QoL, such as the previous version of the EORTC-QLQ-CR29, the EORTC-QLQ-CR38, such as Santos (20), Franca Neto and cols (21) and Yang and cols (22). In addition, there are few similar results with the present study. No studies were found comparing the ostomy time and nutritional status with QoL using the instrument EORTC-QLQ-CR29 and it is important to highlight that author used the biochemical level to classified the nutrition status and we used the more widely measured, the body mass index.

Ferreira and cols (17) comparing the time of ostomy with financial difficulty found moderate difficulty and associated with the removal of the labor market as a cause. If we look at the monthly income of ostomized patients one year ago, 44.2% receive up to two minimum wages, a contributing factor for financial difficulty. The association of income and health is expected, where people with higher incomes have better health, because the greater the access to nutrition and life expectancy, for example (23,24).

No studies was found associating sleep disorders with malnutrition. Simões in a review article, reports that the pain of the oncologic patient generates loss of appetite and sleep disturbance (25). For our best knowledge, it is the first study that showed the association of malnutrition with abdominal pain and other gastrointestinal disturbance in ostomized patients.

Regarding the urinary incontinence item, we could be justified by the age of the individuals, once that the most of our patients are elderly, in agreement with other studies (18,21). The prevalence of urinary incontinence in the elderly is high and among the causes are the tissue changes that appear with passing of the age and that they compromise the urinary tract, of the central and peripheral nervous system, menopause for women and benign prostatic hyperplasia for men and side effects of medications (26,27).

For de bloating domain, it was found a study in the literature that associated it with QoL but did not do so for nutritional status (19). Patients complaining of abdominal discomfort, such as gas, report altering the diet, avoiding flatulent foods that may worsen the condition and this may lead to worsening nutritional status (28). The concerned about weight can arise through a weight loss due to disease and with that the fear of not recovering it (29). The evolution of the disease and the decrease of food intake cause the weight loss of cancer patients, which may have a self-perceptive distortion on the weight, both overestimate and underestimate. A study that evaluated the body image of patients with gastrointestinal cancer showed that patients with colon and sigmoid tumor had lower desire to increase body size (30).

Using EORTC-QLQ-CR38, a version prior to EORTC-QLQ-CR29, Santos (20) assessed patients with and without a stoma where women reported less sexual activity, being this statistically significant difference. As for the diminished sexual interest in undernourished women, we could observe that the modifications in the body image contributes to this, fact also that depends on the previous conjugal situation of the ostomy (29). Silva and Shimizu (31), in a qualitative study, demonstrated that ostomized patients reported loss of libido and pain, which contributes to a decrease in sexual interest.

In the present study more than half of sample showed a nutritional deviance, 23.4% were malnourished and almost a 30% with overweight or obesity according to BMI. Fortes (16) found in its study 35.71% of overweight individuals, 12.86% with obesity and only 5.71% in the lean range according to BMI. Barbosa, Lacerda-Filho and Barbosa (32) using the same parameter evidences obesity in patients with colorectal cancer, where 33.3% of obese individuals were found, 14.3% were overweight and only 7.6% were malnourished. McSorley and cols (33) by means of tomography, identified 62% of overweight or obese patients.

It is known that catabolism is present in cancer patients, but in more recent studies on colorectal cancer we see overweight and obesity rising when we analyzed BMI and percentage of body fat, this is due to the probable fact of alterations in body composition, with loss of lean body

mass from nutritional diagnosis to recovery after ostomy. However, cachexia is also found even in obese patients. In addition to assessing the nutritional status through BMI, the fat free mass index, by doing so we can confirm the patient's actual nutritional status. Beyond to worsening of the prognosis and lower survival, cancer patients with cachexia and obesity may lead to worsening of QoL (34). Another factor that should be taken into consideration is that most patients are elderly and do not perform manual work as previously, which can lead to a loss of lean mass. In addition, it should be noted that the patients in the present study have ostomy in the colon, therefore they have less nutritional losses than patients with ostomy located in the ileum.

This study has as limitations the fact that it has been cross-sectional, not giving us the cause and effect relationship. Another factor is the different ostomy times between patients. In addition, parameters for assessing nutritional status more specifically like the sarcopeny level may be expanded in other surveys. Other study suggestions are to follow these patients longer in a prospective study and to correlate food intake with QoL and nutritional status in sense to adjust probably other confounding variables.

5. Conclusion

The study showed that the ostomy time and nutritional status influence in some QoL domains in patients with colorectal cancer in postoperative ostomy.

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Contributions

KS, TS and GP designed the study. AD, AC and LC collected and analysed data. KS and GP wrote and reviewed the paper. KS and GP have primary responsibility for the final content. All authors read and approved the final manuscript.

Conflict of interest

All authors have no conflict of interest.

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Figure 1. Relation of acceptance and refusal of the patients in the study

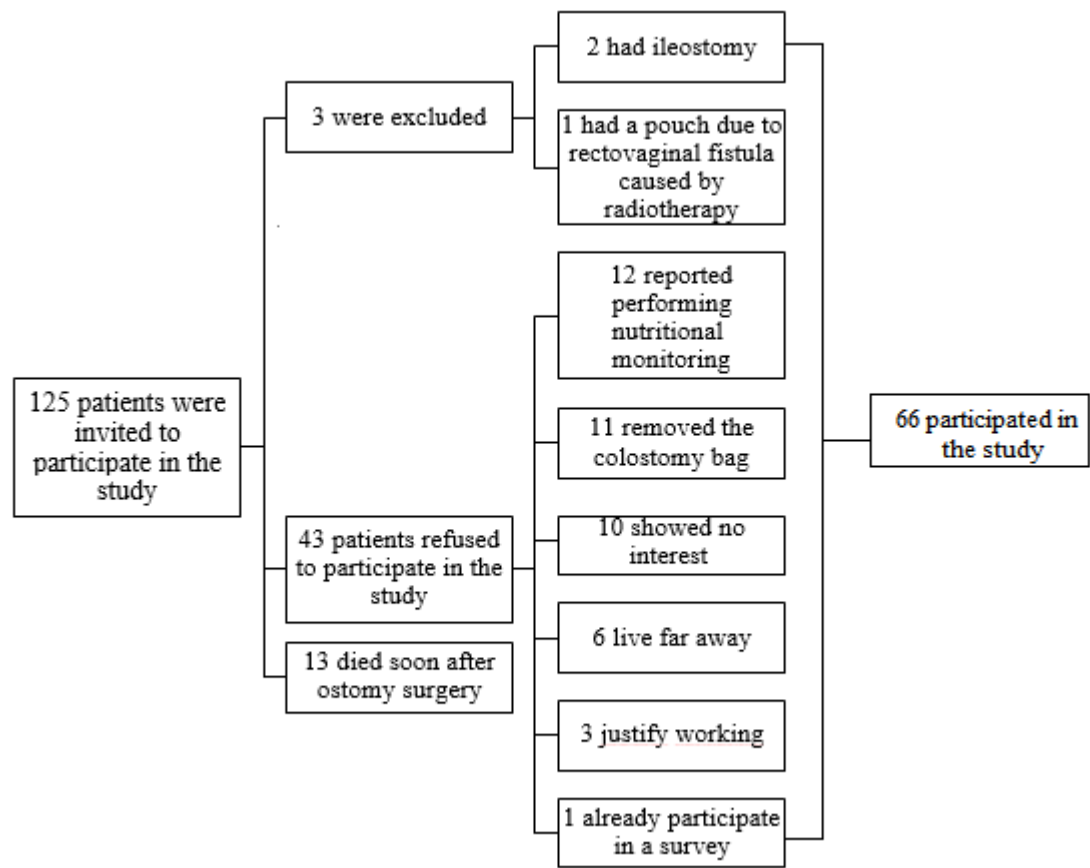


Table 1. Frequency of socioeconomic and clinical variables in ostomized patients due to colorectal cancer due to ostomy time and nutritional status

Variables	Total	Ostomy time (years)			P value*	Total	BMI		P value*
		< 1	1 to 2	> 2			Malnourished	Not malnourished	
% (n)									
Socioeconomic									
Age (years)									
< 55	24.2 (16)	24.3 (9)	30.8 (4)	18.8 (3)	0.493	21.9 (14)	23.1 (3)	21.6 (11)	0.907
55 to 65	30.3 (20)	37.8 (14)	15.4 (2)	25.0 (4)		31.3 (20)	38.5 (5)	29.4 (15)	
65 - 70	19.7 (13)	21.6 (8)	15.4 (2)	18.8 (3)		20.3 (13)	15.4 (2)	21.6 (11)	
> 70	25.8 (17)	16.2 (6)	38.5 (5)	37.5 (6)		26.6 (17)	23.1 (3)	27.5 (14)	
Gender									
Male	51.5 (34)	45.9 (17)	69.2 (9)	50.0 (8)	0.349	51.6 (33)	53.8 (7)	51.0 (26)	0.854
Female	48.5 (32)	54.1 (20)	30.8 (4)	50.0 (8)		48.4 (31)	46.2 (6)	49.0 (25)	
Ethnicity									
White	36.4 (24)	27.0 (10)	69.2 (9)	31.3 (5)	0.220	35.9 (23)	23.1 (3)	39.2 (20)	0.279
Not white	63.6 (42)	73.0 (27)	30.8 (4)	68.8 (11)		64.1 (41)	76.9 (10)	60.8 (31)	
Education (years)									
< 9	54.5 (36)	48.6 (18)	76.9 (10)	50.0 (8)	0.189	56.3 (36)	46.2 (6)	58.8 (30)	0.713
9 to \geq 12	21.2 (14)	29.7 (11)	7.7 (1)	12.5 (2)		18.8 (12)	23.1 (3)	17.6 (9)	
\leq 12	24.2 (16)	21.6 (8)	15.4 (4)	37.5 (6)		25.0 (16)	30.8 (4)	23.5 (12)	
Income (\$)									
< 294	16.4 (10)	11.8 (4)	15.4 (2)	28.6 (4)	0.713	16.9 (10)	15.4 (2)	17.4 (8)	0.945
294 to 589	34.4 (21)	32.4 (11)	38.5 (5)	35.7 (5)		33.9 (20)	38.5 (5)	32.6 (15)	
589 to 883	21.3 (13)	26.5 (9)	23.1 (3)	7.1 (1)		20.3 (12)	23.1 (3)	19.6 (9)	
\geq 883	27.9 (17)	29.4 (10)	23.1 (3)	28.6 (4)		28.8 (17)	23.1 (3)	30.4 (14)	

BMI (Body Mass Index): Adults (kg/m²): <18,5 low weight; \leq 18,5 - <25 eutrophic; \leq 25 - <30 overweight; \geq 30 obesity; Elderly (kg/m²):

<23,0 low weight; 23 - <28 eutrophic; \geq 28 - <30 overweight; \geq 30 obesity. *Chi-square test.

Table 1. Frequency of socioeconomic and clinical variables in ostomized patients due to colorectal cancer due to ostomy time and nutritional status

Variables	Ostomy time (years)				P value*	Nutritional status			P value*
	Total	< 1	1 a 2	> 2		Total	Malnourished	Not malnourished	
% (n)									
Clinics									
Diagnostic time (months)									
< 12	39.7 (25)	70.6 (24)	0.0 (0)	6.3 (1)	<0.001	39.3 (24)	69.2 (9)	31.3 (15)	0.036
≥ 12 to < 24	28.6 (18)	23.5 (8)	76.9 (10)	0.0 (0)		27.9 (17)	7.7 (1)	33.3 (16)	
≥ 24	31.7 (20)	5.9 (2)	23.1(3)	93.8 (15)		32.8 (20)	23.1 (3)	35.4 (17)	
Tumor location									
Retosigmoid	17.2 (10)	20.6 (7)	0.0 (0)	25.0 (3)	0.195	17.9 (10)	27.3 (3)	15.6 (7)	0.363
Colon	82.8 (48)	79.4 (27)	100.0 (12)	75.0 (9)		82.1 (46)	72.7 (8)	84.4 (38)	
Comorbidities									
No	36.4 (24)	40.5 (15)	23.1 (3)	37.5 (6)	0.652	34.4 (22)	61.5 (8)	27.5 (14)	0.068
1	40.9 (27)	40.5 (15)	53.8 (7)	31.3 (5)		42.2 (27)	23.1 (1)	47.1 (24)	
2 or more	22.7 (15)	18.9 (7)	23.1 (3)	31.3 (5)		23.4 (15)	15.4 (2)	25.5 (13)	
Ostomy time (years)									
< 1	–	–	–	–	0.152	56.3 (36)	69.2 (9)	52.9 (27)	0.152
1 to 2	–	–	–	–		18.8 (12)	0.0 (0)	23.5 (12)	
> 2	–	–	–	–		25.0 (16)	30.8 (4)	23.5 (12)	
BMI									
Low weight	23.4 (15)	27.8 (10)	8.3 (1)	25.0 (4)	0.312	–	–	–	–
Eutrophic	46.9 (30)	50.0 (18)	50.0 (6)	37.5 (6)		–	–	–	
Overweight	20.3 (13)	19.4 (7)	16.7 (2)	25.0 (4)		–	–	–	
Obesity	9.4 (6)	2.8 (1)	25.0 (3)	12.5 (2)		–	–	–	

BMI (Body Mass Index): Adults (kg/m²): <18,5 low weight; ≤18,5 - <25 eutrophic; ≤25 - <30 overweight; ≥ 30 obesity; Elderly (kg/m²): <23,0 low weight; 23 - <28 eutrophic; ≥ 28 - <30 overweight; ≥ 30 obesity. *Chi-square test.

Table 2. Mean and median of the scales of EORTC QLQ-C30 and EORTC QLQ-CR29 quality of life scores of patients with colorectal cancer

Scale	Ostomy time (years)				P value*	Nutritional status		P value*
	Total	< 1	1 a 2	> 2		Malnourished	Not malnourished	
	Mean (Md)							
	Min-Max							
Physical function	83.25 (90.0) 45.0 - 100.0	78.19 (86.66) 40.0 - 100.0	85.64 (93.33) 26.67 - 100.0	70.0 (66.66) 33.33 - 100.0	0.178	68.71 (66.66) 33.33 - 100.0	80.78 (86.66) 33.33 - 100.0	0.078
Role function	73.23 (83.33) 0.0 - 100.0	69.36 (83.33) 0.0 - 100.0	73.07 (100.0) 16.67 - 100.0	82.29 (100.0) 33.33 - 100.0	0.369	67.94 (83.33) 0.0 - 100.0	74.83 (83.33) 0.0 - 100.0	0.468
Emotional function	72.47 (83.33) 0.0 - 100.0	70.94 (83.33) 0.0 - 100.0	76.28 (83.33) 0.0 - 100.0	72.91 (79.16) 8.33 - 100.0	0.853	69.87 (75.0) 25.0 - 100.0	72.71 (83.33) 0.0 - 100.0	0.760
Cognitive function	81.06 (83.33) 0.0 - 100.0	82.88 (100.0) 16.67 - 100.0	76.92 (83.33) 16.67 - 100.0	80.20 (91.66) 0.0 - 100.0	0.734	80.76 (100.0) 0.0 - 100.0	81.69 (83.33) 16.67 - 100.0	0.902
Social function	84.34 (100.0) 0.0 - 100.0	80.18 (100.0) 0.0 - 100.0	88.46 (100.0) 0.0 - 100.0	90.62 (100.0) 50.0 - 100.0	0.420	79.48 (100.0) 0.0 - 100.0	84.96 (100.0) 0.0 - 100.0	0.553
Pain	19.44 (0.0) 0.0 - 100.0	20.72 (0.0) 0.0 - 100.0	17.94 (0.0) 0.0 - 100.0	17.70 (0.0) 0.0 - 100.0	0.931	25.64 (0.0) 0.0 - 100.0	18.30 (0.0) 0.0 - 100.0	0.450
Fatigue	24.24 (11.11) 0.0 - 100.0	23.72 (22.22) 0.0 - 100.0	16.23 (0.0) 0.0 - 66.67	31.94 (22.22) 0.0 - 100.0	0.378	35.04 (22.22) 0.0 - 88.89	21.56 (11.11) 0.0 - 100.0	0.154
Nausea and vomiting	11.36 (0.0) 0.0 - 100.0	13.51 (0.0) 0.0 - 100.0	12.82 (0.0) 0.0 - 50.0	5.20 (0.0) 0.0 - 50.0	0.498	20.51 (16.66) 0.0 - 83.33	9.47 (0.0) 0.0 - 100.0	0.141
Dyspnea	7.07 (0.0) 0.0 - 100.0	5.40 (0.0) 0.0 - 66.67	5.12 (0.0) 0.0 - 66.67	12.50 (0.0) 0.0 - 100.0	0.490	10.25 (0.0) 0.0 - 100.0	5.22 (0.0) 0.0 - 66.67	0.415
Sleep disturbance	26.26 (0.0) 0.0 - 100.0	32.43 (0.0) 0.0 - 100.0	17.94 (0.0) 0.0 - 100.0	18.75 (0.0) 0.0 - 100.0	0.362	48.71 (33.33) 0.0 - 100.0	20.26 (0.0) 0.0 - 100.0	0.019
Appetite	17.67 (0.0) 0.0 - 100.0	23.42 (0.0) 0.0 - 100.0	10.25 (0.0) 0.0 - 66.67	10.41 (0.0) 0.0 - 100.0	0.276	30.76 (0.0) 0.0 - 100.0	15.03 (0.0) 0.0 - 100.0	0.126
Constipation	8.08 (0.0) 0.0 - 100.0	5.40 (0.0) 0.0 - 66.67	12.82 (0.0) 0.0 - 100.0	10.41 (0.0) 0.0 - 66.7	0.542	7.69 (0.0) 0.0 - 66.67	8.49 (0.0) 0.0 - 100.0	0.911
Diarrhea	18.18 (0.0) 0.0 - 100.0	21.62 (0.0) 0.0 - 100.0	20.51 - 0.0 0.0 - 100.0	8.33 (0.0) 0.0 - 100.0	0.410	25.64 (0.0) 0.0 - 100.0	14.37 (0.0) 0.0 - 100.0	0.276
Financial impact	26.26 (0.0) 0.0 - 100.0	36.03 (33.33) 0.0 - 100.0	17.94 (0.0) 0.0 - 100.0	10.41 (0.0) 0.0 - 100.0	0.045	35.89 (33.33) 0.0 - 100.0	23.52 (0.0) 0.0 - 100.0	0.290

Data presented on mean, median, minimum and maximum. *ANOVA test.

Table 2. Mean and median of the scales of EORTC QLQ-C30 and EORTC QLQ-CR29 quality of life scores of patients with colorectal cancer

Scale	Ostomy time (years)				P value*	Nutritional status		P value*
	Total	< 1	1 a 2	> 2		Malnourished	Not malnourished	
	Mean (Md)							
	Min-Max							
Global quality of life	77.14 (83.33) 16.67 - 100.0	78.82 (91.66) 25.0 - 100.0	72.43 (75.0) 16.67 - 100.0	77.08 (83.33) 25.0 - 100.0	0.674	73.07 (75.0) 25.0 - 100.0	78.75 (83.33) 16.67 - 100.0	0.415
Urinary frequency	76.26 (100.0) 0.0 - 100.0	76.57 (100.0) 0.0 - 100.0	71.79 (100.0) 0.0 - 100.0	79.16 (91.66) 16.67 - 100.0	0.829	62.82 (66.66) 0.0 - 100.0	80.39 (100.0) 0.0 - 100.0	0.074
Blood or mucus in stools	94.44 (100.0) 50.0 - 100.0	92.79 (100.0) 50.0 - 100.0	96.15 (100.0) 50.0 - 100.0	96.87 (100.0) 50.0 - 100.0	0.534	91.02 (100.0) 50.0 - 100.0	95.75 (100.0) 50.0 - 100.0	0.254
Stool frequency	92.17 (100.0) 0.0 - 100.0	90.09 (100.0) 0.0 - 100.0	88.46 (100.0) 33.33 - 100.0	100.0 (100.0) 100.0 - 100.0	0.244	100.0 (100.0) 100.0 - 100.0	91.83 (100.0) 50.0 - 100.0	0.197
Body image	80.13 (88.88) 0.0 - 100.0	78.07 (88.88) 0.0 - 100.0	76.06 (77.77) 0.0 - 100.0	88.19 (100.0) 33.33 - 100.0	0.389	75.21 (88.88) 0.0 - 100.0	81.91 (100.0) 0.0 - 100.0	0.435
Urinary incontinence	5.55 (0.0) 0.0 - 100.0	0.0 (0.0) 0.0 - 0.0	12.82 (0.0) 0.0 - 100.0	12.50 (0.0) 0.0 - 100.0	0.046	7.69 (0.0) 0.0 - 100.0	3.92 (0.0) 0.0 - 100.0	0.540
Dysuria	9.59 (0.0) 0.0 - 100.0	12.61 (0.0) 0.0 - 100.0	10.25 (0.0) 0.0 - 100.0	2.08 (0.0) 0.0 - 33.33	0.422	7.69 (0.0) 0.0 - 100.0	10.45 (0.0) 0.0 - 100.0	0.745
Abdominal pain	19.19 (0.0) 0.0 - 100.0	21.62 (0.0) 0.0 - 100.0	20.51 (0.0) 0.0 - 100.0	12.50 (0.0) 0.0 - 66.67	0.603	35.89 (33.33) 0.0 - 100.0	15.03 (0.0) 0.0 - 100.0	0.028
Buttock pain	12.62 (0.0) 0.0 - 100.0	16.21 (0.0) 0.0 - 100.0	7.69 (0.0) 0.0 - 66.67	8.33 (0.0) 0.0 - 100.0	0.504	17.94 (0.0) 0.0 - 100.0	10.45 (0.0) 0.0 - 100.0	0.384
Bloating	17.67 (0.0) 0.0 - 100.0	19.81 (0.0) 0.0 - 100.0	15.38 (0.0) 0.0 - 100.0	14.58 (0.0) 0.0 - 100.0	0.832	38.46 (0.0) 0.0 - 100.0	13.07 (0.0) 0.0 - 100.0	0.011
Dry mouth	44.44 (33.33) 0.0 - 100.0	40.54 (33.33) 0.0 - 100.0	48.71 (66.66) 0.0 - 100.0	50.0 (33.33) 0.0 - 100.0	0.639	43.58 (33.33) 0.0 - 100.0	43.79 (33.33) 0.0 - 100.0	0.987
Hair loss	7.07 (0.0) 0.0 - 100.0	10.81 (0.0) 0.0 - 100.0	2.56 (0.0) 0.0 - 33.33	2.08 (0.0) 0.0 - 33.33	0.255	12.82 (0.0) 0.0 - 66.67	5.88 (0.0) 0.0 - 100.0	0.291
Taste	9.59 (0.0) 0.0 - 100.0	11.71 (0.0) 0.0 - 100.0	12.82 (0.0) 0.0 - 100.0	2.08 (0.0) 0.0 - 33.33	0.397	15.38 (0.0) 0.0 - 100.0	7.18 (0.0) 0.0 - 100.0	0.288
Anxiety	45.95 (33.33) 0.0 - 100.0	52.25 (66.66) 0.0 - 100.0	28.20 (33.33) 0.0 - 100.0	45.83 (33.33) 0.0 - 100.0	0.216	56.41 (66.66) 0.0 - 100.0	44.44 (33.33) 0.0 - 100.0	0.371
Weight	21.21 (0.0) 0.0 - 100.0	19.81 (0.0) 0.0 - 100.0	17.94 (0.0) 0.0 - 100.0	27.08 (0.0) 0.0 - 100.0	0.755	48.71 (33.33) 0.0 - 100.0	15.03 (0.0) 0.0 - 100.0	0.002

Data presented on mean, median, minimum and maximum. *ANOVA test.

