

ASSOCIATION BETWEEN RESILIENCE AND QUALITY OF LIFE IN PATIENTS WITH COLON CANCER

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received: 5.9.2021;

revised: 3.10.2021;

accepted: 15.11.2021

SUMMARY

Introduction: Colon cancer is one of the most common malignancies. Numerous studies suggest an association between resilience and quality of life in colon cancer patients. The aim of this study was to explore the association between resilience and quality of life in people with colon cancer.

Subjects and methods: A cross-sectional study was conducted on a sample of 200 subjects at the Oncology Clinic of the University Clinical Hospital Mostar. Data were collected in the period between April 2019 and June 2021. A socio-demographic questionnaire specifically designed for this study, a CD-RISC-25 scale for assessing resilience, and a WHOQOL-BREF questionnaire for assessing quality of life were used for collecting data.

Results: A statistically significant positive association of resilience with all domains of quality of life was found. The mental health domain contributed the most statistically significantly positively to the level of resilience. Patients who were not married had a statistically significantly higher level of resilience compared to married, divorced and widowed patients. No statistically significant difference was found in resilience levels relative to other socio-demographic factors and cancer stage. Patients treated with a combination of surgery and chemotherapy had a statistically significantly higher level of resilience compared to patients treated with other therapeutic methods.

Conclusions: Higher level of resilience statistically significantly contributes to a higher level of quality of life in people with colon cancer.

Key words: resilience - quality of life - colon cancer

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INTRODUCTION

Colon cancer is one of the most common malignancies and is one of the major public health burdens in the world, especially in developed countries. Hence, colon cancer is a challenge for researchers in various fields of health and medical sciences (Gunney et al. 2015, Müller et al. 2016, Wright et al. 2017). The term psychological resilience refers to the process of overcoming adverse events, including stress, trauma, and illness, and resilience refers to personality traits associated with that process (Jakšić et al. 2012). Resilience is a complex set of diverse protective and salutogenic factors and processes which are very important for understanding health and disease, healing processes, including comorbid and multimorbid conditions (Masten et al. 2012). Creating a more resilient brain in people with cancer is a huge challenge facing modern basic and clinical sciences (Jakovljević 2019, Jansen et al. 2011). Adverse life circumstances, accidents or experiences such as the diagnosis of a carcinogenic disease represent the disruption of functions or sustainability of the system and jeopardize the adaptation or development of the individual (Sawyer et al. 2010). Numerous studies suggest an association between resilience and

quality of life in colon cancer patients. One year after the diagnosis, people with colon cancer suffer from nausea and reduced emotional functionality. There are various negative effects that affect the physical, social and psychological component of a patient's life. At the beginning, patients are not used to a different appearance of their body, when it comes to wearing a stoma, they are afraid that they will be rejected by their own family and friends. A large proportion of patients becomes introverted and do not want contact with their surroundings. They are not familiar with the adjusted diet, physical activity and rights they have (Ratjen et al. 2018).

Going through difficult life experiences such as colon cancer can have different outcomes. Some people develop post-traumatic stress disorder while others experience post-traumatic growth (Tedeschi & Calhoun 1996). Strengthening resilience contributes to the growth of feelings of hope for a positive treatment outcome in people with colon cancer (Solano et al. 2016). Studies to date have shown that resilience affects lower levels of emotional acute stress, better adjustment, and better quality of life in people with cancer. Overall mood disorders and disorders of psychological functioning are common and associated with stress caused by an individual's adjustment to the

fact that they are suffering from cancer. An individual cannot know what level of resilience he possesses until he faces an adversity or traumatic event like a diagnosis of carcinogenic disease. Cancer survivors, who are more optimistic and have a positive attitude about their future, cope better with carcinogenic disease and may experience posttraumatic growth (Heidarzadeh et al. 2018). Experts and scientists around the world are researching the topic of the relation between personality, psychological resilience and quality of life in patients with colon cancer. To our knowledge, no research has been conducted to date on the relationship between resilience and quality of life in people with colon cancer in Bosnia and Herzegovina. The aim of this study was to explore the association between resilience and quality of life in people with colon cancer. An additional aim was to explore the level of resilience of patients with colon cancer in relation to socio-demographic factors, stage of cancer and type of treatment.

SUBJECTS AND METHODS

A cross-sectional study was conducted on a sample of 200 subjects at the Oncology Clinic of the University Clinical Hospital Mostar. Data were collected in the period between April 2019 and June 2021. We used the "drop-off" survey method. Patients were divided into four groups determined according to the pathohistological stage of colon cancer which is determined according to the Dukes classification (A, B, C, D). The criteria for inclusion of patients were: patients of the Oncology Clinic suffering from colon cancer with pathohistological findings by gastroenterologists and oncologists, aged between 35 and 75 years, who completed treatment and are in the monitoring phase by oncologists, have knowledge of Croatian language (reading and writing), the possibility of completing the questionnaire independently. Patients who incorrectly filled in the questionnaire were excluded from the research. Questionnaires in which patients gave full answers to questions and claims were considered valid. The exclusion criteria were: diagnosed mental illness and mental retardation as well as diagnosed severe organ disease (stroke, heart attack, severe disability and other organ diseases that reduce the quality of life). A sample size of 140 subjects was required for test strength of $\beta = 0.80$. In order to raise the quality and strength of the research, the total sample size in this paper was 200 patients. A total of 18 patients refused to participate in the survey or did not return the questionnaire, so the response rate of patients was 91.7%.

Patients were informed of all possible advantages, disadvantages, risks and consequences of participating in the research, and all gave their written consent to participate in the research and had the right to withdraw from the research at any time without further explanation. Confidentiality was obtained by encrypting

personal data, and the list of names and associated codes were kept by the research leader in a confidential and secure place. Permission for this study was obtained from the ethics committee of the University Clinical Hospital, Mostar (23/07/2019-405/19).

Questionnaires

A socio-demographic questionnaire specifically designed for this study was used to obtain data on patients such as: age, gender, education, marital status, who they live with, employment, place of residence (city or village), smoking (yes or no), cancer stage, type of treatment.

The Connor Davidson-Resilience Scale-25 (CD-RISC-25) questionnaire was used to assess resilience and consists of 25 particles, and each question is scored from 0 to 4 on the Likert scale. After the transformation of points, the points fall within 0-100. The highest scores within the score scale indicate the highest resilience or ability to recover in patients (Dimitrovska et al. 2015). The Cronbach's alpha confidence coefficient for this questionnaire was 0.89.

The WHOQOL-BREF Quality of Life Questionnaire was used to assess quality of life. Perceptions of quality of life in each of the four domains of quality of life (physical health, mental health, social relations, and the environment) are scored, with the scale positively directed. The questionnaire consists of 26 particles, and each question is scored on a Likert scale from 1 (worst) to 5 (best). After the transformation of points, which is performed in two steps, the points for each domain fall within the scale 0-100 (The World Health Organization 1998). Based on the equidistant structure of the Likert scale, this study took into account that patients with a value greater than 60% of the scale maximum (SM) in a particular domain have a good quality of life in the same domain, and those with a value below 60% SM have a poor quality of life in that same specific domain. The confidence coefficients for this questionnaire were 0.80 for the domain of physical health (7 particles), 0.82 for the domain of mental health (6 particles), 0.65 for the domain of social relations (3 particles), 0.76 for the domain of environment (8 particles) and 0.60 for overall quality of life (2 particles). A lower confidence coefficient of the internal consistency type was recorded in relation to the scale used to measure the domain of social relations and overall satisfaction with the quality of life. The reason for this may be the small number of particles on their scales. Nevertheless, the social relations and overall quality of life domain scales did not have internal consistency coefficients lower than the established scale acceptance criterion (0.55), so no scale was omitted from further results analysis procedures.

All aforementioned questionnaires used in this study were standardized, validated, and approved by the authors and expert commissions.

Statistical analysis

The collected data were processed by the method of descriptive statistics. The statistical software used for data analysis was SPSS for Windows, version 26.0 (IBM, Armonk, New York, USA).

The Kolmogorov-Smirnov test was used to analyze the data distribution. In cases where the distribution deviated from the normal, the median was used for the central tendency measure, while the interquartile range was used for the dispersion measures. Linear regres-

sion analysis, Kruskal-Wallis one-way analysis of variance for differences between three or more groups, one-sided Z-test for differences between two independent samples, and Pearson correlation analysis were applied. In the aforementioned tests, the probability level of $p < 0.05$ was taken as statistically significant.

Data scatter is defined by a 95% confidence interval, 95% CI (engl. *Confidence Interval*). Odds Ratio was used to show the performance measures.

Table 1. Level of resilience in relation to different variables

	M	IQR	Test	p
Gender			Z=-1.286	0.198
Male	71.00	16.00		
Female	75.00	23.00		
Education			H=3.816	0.282
Elementary	70.00	25.00		
High school	74.50	17.00		
Higher education	66.00	20.00		
Master's or Doctorate	73.50	18.25		
Marital status			H=12.540	0.006
Unmarried	76.00	23.25		
Married	73.50	18.00		
Widowed	62.00	16.00		
Divorced	69.00	-		
Who you live with?			H=2.238	0.524
Alone	71.00	22.00		
With spouse	74.00	17.00		
With other family members	69.00	24.25		
Else	71.00	30.00		
Employment			Z=-1.375	0.169
Unemployed	69.00	22.00		
Employed	75.00	65.00		
Place of residence			Z=-1.055	0.291
Town	74.00	18.00		
Village	69.00	19.50		
Smoking status			Z=-0.521	0.602
No	72.50	17.25		
Yes	69.00	24.00		
Cancer stage			H=2.501	0.475
A	68.50	18.00		
B	69.00	30.00		
C	74.00	17.50		
D	72.00	16.75		
Type of treatment			H=13.454	0.036
Surgical	66.00	10.00		
Chemotherapy	75.00	21.00		
Radiotherapy	64.00	9.00		
Surgical and chemotherapy	76.00	16.50		
Surgical and radiotherapy	63.00	24.00		
Chemotherapy and radiotherapy	74.00	26.50		
Surgical, chemotherapy and radiotherapy	69.00	20.00		

n - Number of patients; M - Median; IQR - Interquartile Range; Z - Z-test; H - Kruskal-Wallis test

RESULTS

The mean value of the total resilience of the patients was 71.07 (SD=14.866). The mean age of the subjects was 62.86 (SD=8.021) years. There was a statistically significantly higher number of males, with secondary education who were married, living with a spouse, unemployed and not smoking ($p<0.001$). Statistically significantly the largest number of subjects were treated with a combination of surgery and chemotherapy ($p<0.001$).

Patients who were not married had a statistically significantly higher level of resilience compared to divorcees and widows. Patients treated with a combination of surgery and chemotherapy had a statistically significantly higher level of resilience compared to patients treated with a combination of surgery and radiotherapy (Table 1).

A positive association of resilience with all domains of quality of life was found ($p<0.001$). The strongest positive association was found between the resilience and environmental health of the patients ($r=0.438$). The weakest level of association was found between the level of resilience and overall quality of life ($r=0.321$) (Table 2).

Table 2. Correlations of resilience with quality of life

	Resilience	
	r	p
Physical health	0.323	<0.001
Psychological health	0.409	<0.001
Social relations	0.331	<0.001
Environment	0.438	<0.001
Overall quality of life	0.321	<0.001

r - Pearson's correlation coefficient

Of all the domains of quality of life, the domain of environment has largely contributed to the level of resilience ($\beta=0.304$; $p=0.001$). The contribution was positive. A positive independent contribution to the level of resilience was made by the domain of psychological health ($\beta=0.210$; $p<0.05$). A negative independent contribution to the level of resilience was made by the domain of physical health ($\beta=-0.058$; $p=0.561$). A positive independent contribution to the level of resilience was made by the domain of social relations ($\beta=0.085$; $p=0.281$). The regression analysis model as a whole was statistically significant and explained 23.7% of the variance (Table 3).

Table 3. Predictive contributions of the domains of quality of life to the level of resilience

Resilience	β	t	p
Physical health	-0.058	-0.583	0.561
Psychological health	0.210	1.991	0.048
Social relations	0.085	1.082	0.281
Environment	0.304	3.335	0.001

$R^2=0.237$; Model: $F(195; 4)=12.026$; $p<0.001$;
 β - Standardized beta coefficient; t - T-test

DISCUSSION

The results of this study show that resilience is statistically significantly positively correlated with quality of life in all its domains and with overall satisfaction with the quality in colon cancer patients. Patients who had a higher level of resilience showed a statistically significantly higher level of mental health compared to patients with a lower level of resilience. The domain of quality of life of the environment contributed statistically significantly positively the most to the level of resilience. With regard to socio-demographic variables, non-marital patients had a statistically significantly higher level of resilience compared to divorced and widowed women. In relation to the type of treatment, patients treated with surgery and chemotherapy had statistically significantly higher results compared with patients treated with surgery and radiotherapy.

To date, numerous studies have been conducted worldwide on the association between resilience and quality of life of patients with colon cancer and cancer in general. Our findings confirm the results of many previous studies (Masten et al. 2012, Hwang et al. 2018). A study conducted on the Chinese population also shows that resilience is in a positive association with the quality of life of colon cancer patients (Ye et al. 2017). Some studies indicate that a higher level of resilience has a positive effect on faster recovery from colon cancer and that resilience is positively associated with the physical, mental and spiritual functioning of cancer patients (Babić et al. 2020, Franjić et al. 2019, Hornbrook et al. 2018). Koutrouli et al state that it is not yet known how resilience affects quality of life in people with colon cancer (Koutrouli et al. 2012). Choi et al state that colon cancer patients who do not have limitations in physical movement show a higher level of resilience and quality of life, and that strengthening resilience is an extremely important factor for coping with the disease and recovery (Choi et al. 2012). Gouzman et al state that resilience is positively associated with successful adaptation to life with gastrointestinal cancer and that finding the cause of the associated of these two variables would significantly help in adapting individuals to the change in life caused by colon cancer diagnosis (Gouzman et al. 2015). In accordance with our findings, some studies indicate the importance of social support in strengthening resilience and that social support is an important protective factor for people going through emotionally stressful situations and that social support is positively associated with resilience in people with cancer. Protective factors are necessary in the process of developing resilience in an individual during therapy for carcinogenic disease. Some authors state that resilience negatively correlates with the perception of stress in people with colon cancer (Appleton et al. 2013). Consistent with the results of this study, Kim et al state that there is a positive association

between resilience and social support in colon cancer patients (Kim et al. 2017). The results of our study show that resilience is positively associated with mental health, which confirms the findings of previous studies which show that resilience contributes to a positive mental and spiritual state of the individual (Jakovljević 2017, 2012, Jeste et al 2015). It is important to keep in mind that there are different forms of resilience and that some resilience factors can contribute to the development of others, as well as physiological, psychological, social and spiritual resilience, and primary, secondary and tertiary resilience (Jakovljević & Ostojić 2015, Jakovljević & Jakovljević 2019).

Some studies that dealt with the association between resilience and quality of life in people with bladder cancer state that resilience is a significant predictor of quality of life (Li et al. 2016, Folkman & Moskowitz 2004). Zhang et al state that resilience is an extremely important factor influencing the quality of life in people with breast cancer, and that it is very important to work on strengthening resilience and social support in cancer patients with the ultimate goal of improving their quality of life (Zhang et al. 2019). Consistent with our results, some authors state that people with breast cancer who have a higher level of resilience have a better quality of life (Dimitrovska et al. 2015, Boškailo et al. 2021). From the above studies, it is evident that the level of resilience significantly affects the quality of life regardless of the type of cancer of the research population. During the examination of the factors influencing resilience and post-traumatic growth, it was found that the objective parameters of the diagnosis were not so significant. The subjective interpretation and experience of the disease was more significant (Kim et al. 2017, Lindstrom 2002). In our study, a statistically significant difference was found in the variable marital status between patients in the level of resilience, while in the socio-demographic variables gender, level of education, employment and place of residence, no statistically significant difference was found. Contrary to our results, some studies indicate that socio-demographic factors such as gender (Padilla Ruiz et al. 2019), level of education (Gao et al. 2019), employment (Seiler & Jenewin 2018) and place of residence (Lee et al. 2013, Plitzko et al. 2020) statistically significantly affect the level of resilience. In relation to the type of treatment of colon cancer subjects, Zhang et al. found that there was a significant association between the type of treatment and posttraumatic growth in people with colon cancer (Zhang et al. 2019). In contrast to our results, some studies indicate that there is no significant difference between patients with colon cancer who were treated with surgery and those who were not treated with surgery in relation to the level of resilience (Tamura et al. 2021, Matzka et al. 2016). Many studies to date state that it is very important to conduct psychological interventions to strengthen resilience in order to improve the

quality of life of patients with colon cancer (Mohlin et al. 2021, Dimitrovska et al. 2015, Skodol 2010). Numerous studies indicate the fact that resilience contributes to a positive psychological state of an individual (Jakovljević 2019, 2017, Jakšić et al 2015). The findings to date indicate the fact that the mental health of an individual is based on the psychological resilience of the individual and that resilience is strongly associated with the improvement of mental health (Jakovljević 2018).

Certain limitations of it should be taken into account when considering the results of this study. First, there was a possibility that patients were not able to assess some aspects of the personal situation objectively due to not enough knowledge or personal fears or not understanding completely what they were asked. Second, a cross-sectional study design was used. In order to monitor changes in research variables over a certain period of time, we recommend that future studies use a longitudinal design. We recommend that future studies additionally apply the focus group method, which will provide more subjective explanations of the patient's attitudes. In addition to the above limitations, the obtained results and the constant relevance and significance of the topic give significant meaning and value to the study. This primarily refers to the contribution in elucidating the complex relationship between resilience and quality of life in colon cancer patients. The results of this study may provide guidance in establishing resilience-enhancing interventions in colon cancer patients, with the ultimate goal of promoting a holistic approach to the treatment of cancer patients.

CONCLUSIONS

Higher level of resilience statistically significantly contributes to a higher level of quality of life in people with colon cancer. Colon cancer patients who were not married had a statistically significantly higher level of resilience compared to married, divorced and widowed patients. Patients treated with a combination of surgery and chemotherapy had a statistically significantly higher level of resilience compared to patients treated with other therapeutic methods

Contribution of individual authors:

Darjan Franjić was the project coordinator, responsible for data collection and entry.

Darjan Franjić, Dragan Babić & Inga Marijanović were responsible for the methodological approach and for the study concept, paper composition, theoretical explanations, data interpretation, literature appraisal and English proofreading.

Marko Martinac was responsible for paper composition, data interpretation and statistical analysis.

All authors provided their approval for the final version of the manuscript.

Acknowledgements: None.

Conflict of interest: None to declare.

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