

The role of psychological characteristics of the personality of patients with colorectal cancer in the timeliness of diagnosis verification and prognosis of disease outcome

I. PONOMAREVA¹, Y. PAKHOMOVA¹, D. TSIRING¹, E. SERGIENKO²,
A. VAZHENIN³

¹National Research Tomsk State University, Laboratory of Psychophysiology, Tomsk, Russia

²Institute of Psychology of the Russian Academy of Sciences, Laboratory of Psychology of the Development of the Subject in Normal and Post-Traumatic States, Moscow, Russia

³South Ural State Medical University, Department of Oncology, Radiation Diagnostics and Radiation Therapy, Chelyabinsk, Russia

Abstract. – OBJECTIVE: Colorectal cancer (CRC) has become the third most commonly diagnosed type of cancer in the world. Based on the risk factors for colorectal cancer (behavior, lifestyle), it is important to better understand the behavioral and psychological characteristics of the individual associated with timely seeking medical help, coping with the extreme situation of diagnosis, and the course of the disease. This determined the purpose of the study: identify the psychological characteristics of patients with colorectal cancer associated with the stage of diagnosis verification and the prognosis of disease outcome.

PATIENTS AND METHODS: Coping, quality of life, and resilience, as well as clinical and sociodemographic variables were studied in 72 patients diagnosed with colorectal cancer. The design of the study involved studying the relationship between the stage of cancer and the prognosis of the outcome of the disease, as well as the role of psychological variables in the timeliness of diagnosis and predicting the outcome of cancer.

RESULTS: The stage of verification of colorectal cancer is associated with the prognosis of the outcome of the cancer; the later colorectal cancer is verified, the more unfavorable the prognosis of the outcome of the oncological disease. Escape-avoidance coping is associated with the verification stage of colorectal cancer; pronounced avoidance is associated with the late verification stage. Coping strategies such as seeking social support, positive reappraisal, risk-taking, pain intensity, and role functioning significantly influence the prognosis of colorectal cancer outcomes.

CONCLUSIONS: The psychological characteristics of the personality of patients with

colorectal cancer have been identified, which, by determining the behavior of patients, affect the timeliness of diagnosis verification and the prognosis of the outcome of the disease.

Key Words:

Psycho-oncology, Oncopsychology, Stage of diagnosis verification, Colorectal cancer, Prognosis of cancer outcome, Psychological predictors, Favorable and unfavorable disease course.

Introduction

Recent decades have seen a steady increase in the incidence of colorectal cancer (CRC) in most civilized countries, according to epidemiological literature. The International Agency for Research on Cancer (IARC) estimates that colorectal cancer became the third most commonly diagnosed type of cancer in the world in 2020, with nearly 2 million new cases reported. It was the third most common cancer in men and the second most common in women, after breast cancer. Colorectal cancer was also the second leading cause of cancer deaths worldwide, causing nearly 1 million deaths¹. Recognized risk factors for colorectal cancer include obesity, low levels of physical activity, poor diet, and tobacco smoking. Alcohol consumption is also a known risk factor for colorectal cancer². Experts at the World Health Organization say you can reduce your risk of colorectal cancer by adopting a healthier lifestyle. The absolute number of CRC cases worldwide is projected to increase over the next two decades

as a result of population growth and aging in both developed and developing countries³. The disease can manifest itself with symptoms of dysfunction of the gastrointestinal tract (nausea, vomiting, diarrhea, constipation, flatulence, lack of appetite, abdominal pain), anemia, weight loss, weakness, fever, discharge of blood and mucus with feces. Also, the disease can begin with a picture of acute or partial intestinal obstruction⁴.

Several investigations⁵⁻¹¹ examining psychological factors in the progression and trajectory of cancer reveal findings related to depression^{5,6}, anxiety^{7,8}, stress⁹, and traumatic life events^{10,11}. The role of psychological personality characteristics in the incidence and development of colorectal cancer has been studied for a long time. The investigation into the origins of cancer explores psychological elements and personality traits as factors that impact survival¹². Systematic reviews also encompass examinations of psychological factors in the progression and trajectory of colorectal cancer, outlining findings from studies on depression and anxiety¹³, suppressed emotions and hopelessness¹⁴, cognitive orientations¹⁵, and anger¹⁶.

Considering the correlation between colorectal cancer and lifestyle, it becomes crucial to enhance our comprehension of the behavioral and psychological traits in individuals, influencing their approach to self and health. Understanding timely medical assistance seeking, diagnosis, and the progression of the disease is essential for devising a more targeted plan for prevention and interventions. Research¹⁷ demonstrates the need to consider psychological and behavioral factors, in addition to genetic and environmental factors, to gain a more complete picture of the determinants underlying colorectal cancer incidence, progression, and survival. Stage at diagnosis is a key predictor of overall cancer outcome. Relative survival at one-year decreases with increasing stage at diagnosis. It has been found that for breast, prostate, and colorectal cancer, the survival rate is significantly reduced if the diagnosis is made at stage 4¹⁸.

The stage of a cancer can also be used to predict its likely course, as well as the likelihood that treatment will be successful. Although each person's situation is different, cancer of the same type and stage usually has a similar outlook. A study by Esteva et al¹⁹ showed that older patients with late-stage (III or IV) tumors presenting to the emergency department had an increased risk of death. To decrease the mortality rate of cer-

tain types of cancer, it is essential to identify the group of patients that are at risk. Additionally, their psychological characteristics must be taken into account to determine the chances of late-stage diagnosis and the prognosis of the disease outcome. There is a need to conceptualize the relationship between psychological characteristics and behavior of colorectal cancer patients by examining a wide range of psychological factors.

The purpose of this study is to identify the psychological characteristics of patients with colorectal cancer that influence the stage, verification of diagnosis, and prognosis of the disease outcome.

Patients and Methods

Patients from the State-Financed Health Institution "Chelyabinsk Regional Clinical Center for Oncology and Nuclear Medicine" were invited to participate in the study from March 2022 to May 2023. This study was approved by the Committee on Bioethics of Tomsk State University [date: 11/02/2021, No. 5 (7)]. The study required participants to be at least 18 years old and to have a verified colorectal cancer diagnosis.

Patients (N=72) were invited to participate in the study; the psychologist explained the goals and methods of the study, and the patient's informed consent to participate was obtained. Participants were asked to complete a series of self-report questionnaires. A special socio-demographic questionnaire was used to collect socio-demographic characteristics, such as age, education, marital status, place of residence, and employment. 16 protocols were excluded due to their partial completion. The final sample consisted of 56 patients. Descriptive statistics of clinical and sociodemographic variables for the entire sample are presented in Table I.

Methods

We used the Ways of Coping Questionnaire (WCQ) adapted by Kryukova²⁰. This methodology includes 50 assumptions grouped into 8 scales to identify coping strategies: confrontation, distancing, self-control, seeking social support, accepting responsibility, avoiding/escaping, planning the steps to solve the problem, and reinterpreting the stressor as a positive or growth-oriented experience. The respondents answered how often they tended to resort to using strategies in difficult life situations.

Table I. Descriptive statistics of sociodemographic and clinical variables.

Variable categories	Variables	N (%)
Sociodemographic variables	Age, median (range)	66 (39-86)
	Gender, men/women	24 (42.8%) / 32 (57.2%)
	Higher education	23 (41%)
	Marital status (married)	33 (58.9%)
	Employment	17 (30.4%)
	Lodging	City - 25 (44.6%)
		Rural area - 31 (55.4%)
Clinical Variables	Cancer stage	I stage - 9 (16.1%)
		II stage - 18 (32.1%)
		III stage - 21 (37.5%)
		IV stage - 8 (14.3%)
	Options for the course of cancer	Remission - 10 (17.9%)
		Stabilization - 15 (26.8%)
		Progression - 16 (28.6%)
Forecast of disease outcome	Relapse - 5 (8.9%)	
	Generalization - 6 (10.7%)	
	Second cancer - 4 (7.1%)	
	Favorable - 25 (44.6%)	
	Unfavorable - 31 (55.4%)	

Additionally, we used the Russian version of the SF-36 Health Survey recommended by the International Centre for Research of Subjective Health Assessment. The test was adapted by Ware et al²¹.

The questionnaire allows the evaluation of subjective perceptions of physical and mental health; it includes the following scales:

- 1) Limitations in physical activities because of health problems.
- 2) Limitations in social activities because of physical or emotional problems.
- 3) Limitations in usual role activities because of physical health problems.
- 4) Bodily pain.
- 5) General mental health (psychological distress and well-being).
- 6) Limitations in usual role activities because of emotional problems.
- 7) Vitality (energy and fatigue).
- 8) General health perceptions.

All scales are combined into two cumulative measurements: physical health (scales 1-4) and mental health (scales 5-8).

Furthermore, we employed S. Maddi's Hardiness Survey adapted by Leontiev and Rasskazova²². This method allows one to assess one's belief system about oneself, the world, and relations with it. The test includes 45 questions, direct and reverse, of 3 scales: engagement, control, and accepting risk.

Statistical Analysis

The data was analyzed using IBM SPSS software version 24.0 for Microsoft (IBM Corp., Armonk, NY, USA). The role of psychological characteristics of the personality of patients with colorectal cancer in the timing of diagnostic verification and prediction of the outcome of the disease was studied. In this study, during the data analysis phase, the initial step involved conducting descriptive statistics by calculating mean values for psychological variables, including coping strategies for overcoming difficulties, life quality indicators, and vitality measures. The role of psychological characteristics of the personality of an oncological patient at the stage of diagnosis verification was studied using regression analysis, and the influence of psychological characteristics on the prognosis of the outcome of the disease was studied using discriminant analysis (Wilks's lambda method was used). $p < 0.05$ was considered statistically significant.

Results

Descriptive statistics of sociodemographic and clinical variables for the entire sample are presented in Table I. The sample consisted of 32 women and 24 men with colorectal cancer, ranging in age from 39 to 86 years (median=66). Almost half of the sample (41%) had higher education, more than half of the sample were in family relationships

(58.9%) and lived in rural areas (55.4%), and a third of the sample were employed (30.4%). Most often, the diagnosis of study participants was verified at stages III and II of colorectal cancer, and more than half of the sample had an unfavorable prognosis for the outcome of the disease (55.4%).

Table II presents the average values of the indicators, the studied psychological characteristics in patients with colorectal cancer with different prognoses of the outcome of the disease, as well as the normative values of the indicators.

Next, we analyzed the relationship between the stage of diagnosis of colorectal cancer and the prognosis of the outcome of the disease (Table III). The values of the χ^2 criterion (9.27) and the p -level value (0.026) indicate a connection between these nominative variables.

To assess the role of psychological characteristics of patients with colorectal cancer in the stage of verification of an oncological diagnosis, we conducted a regression analysis. Assessing

the relationship between psychological characteristics and the stage of cancer diagnosis among study participants, the groups of cancer patients with colorectal cancer at stages I-IV acted as the dependent variable, and the psychological characteristics of the personality of cancer patients were used as independent variables.

The results of the regression analysis indicate that there is a linear relationship between the stage of colorectal cancer of the group participants and the escape-avoidance coping strategy (Table IV); however, the correlation coefficient indicates that this relationship is weak, the R^2 value indicates that 13.6% of the variance variable stage of diagnosis verification is due to the influence of the escape-avoidance variable, and the value of the F-criterion and the significance of p indicate an impact on the dependent variable.

The average values of the "Escape-Avoidance" coping index in cancer patients at stages I-IV of

Table II. The arithmetic means of ways of coping, indicators of the life quality, and hardiness indicators in patients with colorectal cancer.

Psychological characteristics	The arithmetic mean (standard deviation)		
	Respondents with favorable disease course	Respondents with unfavorable disease course	Normative value
Ways of coping			
Confrontation	8.17 (2.74)	9.24 (2.60)	8.9 (2.7)
Distancing	10.73 (7.59)	11.40 (2.51)	8.6 (3)
Self-control	13.00 (2.95)	13.96 (3.00)	13.6 (3)
Seeking social support	10.5 (4.6)	12.00 (2.90)	10.6 (3.1)
Accepting responsibility	7.56 (2.35)	8.88 (2.02)	7.3 (2.1)
Avoidance	10.91 (3.27)	12.36 (3.38)	10.5 (3.5)
Planning the steps to solve the problem	12.52 (2.31)	13.20 (2.69)	12.7 (2.8)
Reinterpreting the stressor as a positive	12.86 (2.98)	14.32 (2.88)	12.3 (3.4)
Indicators of the quality of life			
Physical Functioning (PF)	65.86	64.40	77
Usual role activities caused by physical health problems (RP)	25.00	32.00	53.8
Bodily Pain (BP)	60.13	56.44	61.3
General health perceptions (GH)	56.73	55.92	56.5
Vitality (VT)	56.52	55.20	55.1
Social Functioning (SF)	67.39	62.00	69.6
Usual role activities caused by emotional problems (RE)	24.63	44.00	57.2
Mental Health (MH)	60.34	59.52	5.8
Indicators of hardiness			
Engagement	36.17 (11.45)	30.48 (9.43)	37.6 (8)
Control	28.78 (10.52)	22.68 (6.87)	29.1 (8.4)
Accepting risk	17.65 (8.24)	10.40 (5.36)	13.9 (4.3)
Hardiness	82.60 (28.72)	63.56 (17.87)	80.7 (18.5)

Table III. Combination table for the relationship between the stage and prognosis of the outcome of colorectal cancer, Pearson's χ^2 , significance level.

Cancer stage	Favorable course of cancer, participants	Unfavorable course of cancer, participants	Pearson's χ^2	<i>p</i>
I stage	4	5	}	9.27
II stage	12	6		
III stage	9	12		
IV stage	0	8		
Total predicted disease outcome	25	31		

Table IV. Main results of regression analysis.

Model	R	R ²	ANOVA		Standardized coefficient	<i>t</i>	<i>p</i>
			F	<i>p</i>	Coefficient – β		
1	0.369	0.136	6.768	0.013	0.369	2.602	0.013

the disease indicate that the preference for this strategy of coping behavior increases at each stage. Cancer patients who took part in the study and had a verified diagnosis of colorectal cancer at stage IV most often, compared to other participants (stage I - 8.95, stage II - 11.13, stage III - 11.97), prefer coping by type escape-avoidance (M=13.77). This strategy is associated with infantile forms of behavior in stressful situations.

When solving the problem of assessing the contribution of psychological characteristics to the prognosis of disease outcomes, we carried out discriminant analysis. The results of the discriminant analysis are presented in Table V. The method used was Wilks' method, which is a stepwise method. Assessing the cumulative influence of psychological characteristics on the prognosis of the outcome of colorectal cancer, the dependent variable was the group of participants diagnosed with colorectal cancer with a favorable and unfavorable prognosis of the outcome of the disease, while the independent variables were the psychological characteristics of the personality of cancer patients.

As a result of 5 steps, 5 variables were included in the discriminant equation, having a sufficient level of tolerance (>0.1) and F-criterion

values exceeding the threshold value (>1.125). The results of discriminant analysis indicate that the distribution of study participants into groups with different prognoses of disease outcomes is significantly influenced by risk-taking (an indicator of resilience), seeking social support, and role functioning due to emotional state, pain intensity, and positive reappraisal.

Table V shows the values of the discriminant function, which is informative and explains 100% of the variance, and with a value of $\lambda=0.572$ and statistical significance of $p=0.001$, it indicates that the set of discriminant variables has good discriminative ability. The probability of a correct prediction was 85.4%.

We also determined the coefficients of the canonical discriminant function, which characterize the contribution of each variable to the value of the discriminant function, taking into account the influence of other variables. Thus, the greatest contribution to the value of the discriminant function separating study participants with different prognoses for the outcome of colorectal cancer is made by risk-taking (-0.846), seeking social support (0.546), role functioning due to emotional state (0.501), pain intensity (-0.355) and positive reevaluation (0.279).

Table V. Basic statistics of the canonical discriminant function.

Function	Eigenvalue	% variance explained	Total %	Canonical correlation	λ	Chi-square	<i>p</i>
1	0.749	100	100	0.654	0.572	24.316	0.001

Discussion

Research on the relationship between early diagnosis, seeking primary care and prognosis, outcome, and survival in colorectal cancer is very contradictory. Some studies²³ describe the phenomenon of the “time paradox,” which indicates the absence of a significant relationship between the appearance of the first symptoms and the stage of the disease at the time of diagnosis. While other studies²⁴ prove the influence of late anatomopathological verification on the unfavorable prognosis of outcome (mortality) of patients with colorectal cancer.

In addition, there are studies^{25,26} that describe risk factors for colorectal cancer, including its unfavorable outcome. Cengiz et al²⁵ proved that gender, smoking and exercise influence people’s beliefs regarding the prevention of colorectal cancer and its early detection. Azizi et al²⁶ describe the relationship between the risk of colorectal cancer among people who have experienced negative life events: loss of loved ones, family conflicts and financial problems.

This study of 56 cancer patients with colorectal cancer found a strong association between stage at diagnosis and prognosis for outcome ($p=0.026$). Stages I and II of colorectal cancer verification are associated with a favorable prognosis of the outcome of the disease, while stages III and IV are associated with an unfavorable prognosis.

Such conflicting research results, however, do not explain the increase in mortality from colorectal cancer, so it is necessary to continue to search for factors, including those related to behavioral psychology.

This study found that the escape-avoidance coping strategy is associated with the stage of verification of the diagnosis of colorectal cancer. Cancer patients with stage IV colorectal cancer, more often than other cancer patients from the study, prefer escape avoidance as coping. When the first symptoms manifest, an individual may deny the problem, or completely ignore health problems, avoid taking action to resolve health problems, and be passive²⁷. This short-term coping reduces emotional stress in a cancer patient, but subsequently, there is an effect of accumulation of symptoms and progression of the disease.

The prognosis of the outcome of colorectal cancer is influenced by risk-taking, seeking social support, role functioning due to the emotional state, pain intensity, and positive reappraisal.

A favorable outcome of colorectal cancer is associated with high risk-taking ($M=17.05$), which is associated with resilience. The beliefs of colorectal cancer patients that any experience, even a disease such as cancer, contributes to personal development, and the acquisition of new useful knowledge is associated with a favorable outcome of the disease. In addition, this is how coping works: positive reappraisal - the possibility of personal growth in the process of overcoming the situation of cancer²⁸. In addition, the favorable course of the disease in study participants with colorectal cancer is associated with the search for social support as a coping strategy. In participants of the clinical group with a favorable predicted outcome of the disease, the frequency of use of this coping strategy does not differ from statistical norms ($M=10.00$). However, due to social support in the form of material, emotional, and informational assistance from family, friends, and loved ones, resilience improves, which is an important factor in stress management²⁹. Role functioning based on emotional state (RE) and pain intensity (BP) are indicators of quality of life and are associated with its psychological component. In patients with colorectal cancer with a favorable prognosis for the outcome of the disease, RE has a low value ($M=24.63$), indicating that a depressed emotional state is a limitation in current life processes. Considering the largest contribution of this indicator (-0.929), it can be assumed that a depressed mood and the presence of negative emotions are a kind of “reminder” of the presence of an oncological diagnosis and the need for treatment, which allows you to remain in a state of mobilization and follow the treatment protocol. Due to the favorable outcome prognosis, BP does not significantly limit the activity of the cancer patient.

When the outcome of a disease is unlikely to be favorable, the psychological characteristics of the patient may appear different. The search for social support ($M=12.00$) in combination with low-risk taking ($M=10.4$) places the cancer patient in a position of helplessness, dependent on others, and experiencing psychological distress. In study participants with colorectal cancer with a poor prognosis for disease outcome, RE did not significantly limit daily life, nor did BP. This may be due to coping with the traumatic effects of adverse cancer symptoms. According to cognitive adaptation theory, certain positive illusions (a sense of control, unrealistic optimism) are further activated by traumatic events, facilitating adaptation to adversity³⁰.

Conclusions

In conclusion, the investigation into the impact of psychological traits in patients with colorectal cancer on the prompt verification of an oncological diagnosis and the prognosis of disease outcomes yielded psychological variables that influence the diagnostic stage and play a role in shaping the favorable or unfavorable course of colorectal cancer. Further research is needed to understand the complexity of personality and its role in late seeking medical help and, therefore, late verification of the diagnosis of colorectal cancer, and unfavorable outcome of the disease. The data obtained will be useful to clinical psychologists who provide support to cancer patients in order to correct behavior related to following doctor's orders and timely seeking medical help.

Conflict of Interest

The authors declare that they have no conflict of interests.

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Ethics Approval

This study was conducted in accordance with the 1975 Declaration of Helsinki (as amended in 2013), and the protocol was reviewed and approved by the Committee on Bioethics of Tomsk State University [date: 02/11/2021, No. 5 (7)].

Informed Consent

All subjects provided written informed consent for inclusion before they participated in the study.

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Authors' Contribution

Diana Tsiring: supervision, review, and final approval of the version of the article for publication. Irina Ponomareva: significant contribution to the concept and design of the study, data collection or analysis and interpretation of data, and preparation of the article. Yana Pakhomova: significant contribution to the concept and design of the study, data collection or analysis and interpretation of data, and prepara-

tion of the article. Elena Sergienko: making critical edits related to the relevant intellectual content of the manuscript. Andrey Vazhenin: making critical edits related to the relevant intellectual content of the manuscript.

ORCID ID

D. Tsiring: 0000-0001-7065-0234
I. Ponomareva: 0000-0001-8600-3533
Y. Pakhomova: 0000-0001-9000-7238
E. Sergienko: 0000-0003-4068-9116
A. Vazhenin: 0000-0002-7912-9039

Data Availability

All data generated or analyzed during this study are included in this published article.

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