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Psychological predictors of favorable and unfavorable disease course of prostate cancer: results of a pilot study

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Abstract. – OBJECTIVE: The statistical data on the incidence and mortality rates from prostate cancer leave gaps in understanding the causal risk factors for the unfavorable course of the disease determined the relevance of this work, determined the purpose of the study: to identify psychological predictors of favorable and unfavorable courses of prostate cancer.

PATIENTS AND METHODS: Basic beliefs, coping, quality of life, level of subjective control, resilience, life orientation, as well as socio-demographic characteristics were analyzed in 124 men with different courses of the disease. Firstly, the psychological characteristics of men with prostate cancer with a favorable or unfavorable course were compared, and secondly, psychological predictors were identified and their contribution to the course of prostate cancer was assessed.

RESULTS: It has been established that high involvement as an indicator of resilience, externality in the sphere of failures, the absence of restrictions on daily life due to physical condition, and a low value of belief about control is associated with a favorable course of the disease. The involvement of a man in his own life and ongoing events, interest in his own activities, the conviction that not all events can be controlled, as well as the localization of control outside, contribute to a faster onset of remission or stabilization of the disease.

CONCLUSIONS: The psychological features determine the behavior of men with prostate cancer, including the implementation of doctor's recommendations and compliance with treatment requirements, timely visits to the doctor, taking medications, which in turn determines the course of the disease and the success of treatment.

Key Words:
Psycho-oncology, Oncopsychology, Prostate cancer, Psychological predictors, Favorable and unfavorable disease course.

Introduction

Prostate cancer is one of the most widespread malignant diseases in men. According to the Global Cancer Observatory, prostate cancer ranked fourth in the world for the number of newly identified cases, it's also the eighth leading cause of cancer deaths. Related to this is the fact that more attention is given to the diagnosis and treatment of this disease in the Russian Federation as well as in other countries.

Etiology and pathogenesis of cancer prostate remain poorly studied in medical science. Hereditary factors (including family medical history, race etc.) and acquired factors (including age, unhealthy diet, smoking) are expertise as the main risk factors[1-5]. Alberti[6] notes that genetic factors and their interaction with environmental conditions and the internal microenvironment affect the development of prostate cancer. Several genes have been identified that, when mutated, confer a high risk of prostate cancer. Vitamin D deficiency, high calcium intake, obesity, and high-fat diets have been described as risk factors for prostate cancer[7]. Nevertheless, there is a need for scientific longitudinal studies to verify the supposed relationships between the risk of prostate cancer and other factors[2,3]. According to Ganda-

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glia et al[1], factors influencing disease course and its outcome include metabolic syndrome (obesity, high blood pressure, high blood sugar, and cholesterol). Reportedly, this factor was connected with the development of prostate cancer of more severe type[1].

Some studies[8,9] confirm the connection between obesity and the risk of poor prognosis and lethal outcome. Smoking may also cause severe disease course and its lethal consequence[1,3,10,11]. Innate racial, ethnic, and biological differences might be of paramount importance in the prognosis of unfavorable course of prostate cancer. Men of African descent are more likely to have high rates of morbidity, severe disease course and mortality compared with men of European descent[12]. This difference is attributable to lack of knowledge of prostate cancer and its prevention methods, relatively low access to quality health care, and also, biological hereditary factors[12].

Speaking of predictors of a favorable disease course (remission and stabilization, reducing the risk of progression of the disease), the authors identified a healthy lifestyle and regular physical activity[1,3,13]. Less attention is paid to psychological predictors of prostate cancer. Several individual studies[14] analyzed the correlation between depression and anxiety with the following risks of adverse disease course. Einarsson[15] elaborates on the impact of optimism and pessimism on distress among newly diagnosed prostate cancer patients. Noting the linkage between optimism with lower distress and problem-solving coping strategies, as well as the connection between pessimism with stronger distress and strategies of avoidance and distancing. Einarsson[15] emphasized that pessimism might be a risk factor for the adverse course of prostate cancer. The statistics on the rate of morbidity and mortality are incomplete in understanding the causal factors for adverse disease, and filling the gap is the potential relevance of this study. Also, this study determined its objective as identifying the psychological predictors of the favorable and adverse courses of prostate cancer. Ronco et al[16] found a direct link between dietary acid load and prostate cancer risk. A high acid load in the diet can contribute to the development of prostate cancer[16].

Patients and Methods

In accordance with the objective of this research, a sample of respondents diagnosed with prostate cancer was formed. The study was conducted on the basis of the State-Financed Health Institution «Chelyabinsk Regional Clinical Center for Oncology and Nuclear Medicine». The study covered 124 men, including 61 men with a favorable disease course (the anamnesis did include stabilization and remission), 63 men with an adverse course of the disease (generalization, relapse, acceleration of the disease). In the study group, in all patients, the diagnosis of prostate cancer was confirmed histologically in 124 people (100%). The mean age of the patients was 67.9 years (M=69 years). The histological structure in the analyzed group showed adenocarcinoma of the prostate gland of various degrees of differentiation (with the primary tumor predominating). Clinical data are summarized in Table I.

Methods applied to study psychological predictors of favorable and unfavorable disease courses of prostate cancer included:

- World assumption scale (WAS; Janoff-Bulman) adapted by Padun and Kotelnikova[17]. This methodology includes 37 assumptions distributed on 5 scales: self-worth, benevolence, justice, luck, controllability. The answers of the respondents are scored on a six-point scale.
  The theoretical basis of the methodology is R. Janoff-Bulman's Shattered Assumptions Theory, according to which people structure

Table I. Summary table on prostate cancer and clinical information (N=124).

Age, M	The degree of differentiation of the tumor		Gleason scores		The primary tumor size	
67, 9	G1	19.78 %	Gleason 7 (3+4)	70.32%	T1	6.59%
	G2	72.52%	Gleason 8 (4+4)	20.87%	T2	57.14%
	G3	7.7%	Gleason 9 (4+5)	8.81%	T3	30.76%
					T4	5.51%

experience and shape behavior with the help of cognitive beliefs. This method provides a measure of implicit cognitive beliefs of patients with malignant neoplasms.

- Ways of Coping Questionnaire (WCQ) adapted by Kryukova[18]. 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.
- 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 al[19]. The questionnaire allows evaluating subjective perception 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).
- J. Rotter's Locus of Control Scale adapted by Bazhin et al[20]. The scale evaluates individuals characteristics of subjective control over diverse life experiences, it is intended to diagnose a level of internality/externality in various areas of activity reflected in the scales of assessment: general internality, internality in terms of achievements, internality in terms of failures, internality in terms of family relations, internality in terms of relations of production, internality in terms of interpersonal relations, internality in terms of health and diseases.
- S. Maddi's Hardiness Survey adapted by Leontiev and Rasskazova[21]. This method allows to assess one's belief system about themselves, the world, and relations with it. The test includes 45 questions, direct and reverse, of 3 scales: engagement, control, and accepting risk.
- Life orientation test adapted by Tsiring and Evnina[22]. This diagnostic tool allows evaluating individual personal characteristics that reflect a level of optimism and pessimism as personal disposition.
- Respondents' socio-demographic data collection forms.

Statistical Analysis

The data was analyzed using IBM SPSS software version 24.0 for Microsoft (IBM Corp., Armonk, NY, USA) for the analysis of psychological predictors of favorable and unfavorable disease course of prostate cancer. In this research, when analyzing the data, first of all, descriptive statistics were carried out by calculating the average values of psychological predictors: basic world assumptions, ways of coping, indicators of the quality of life, indicators of subjective control, indicators of hardiness. Then the influence of psychological predictors on the course of the disease was studied using discriminant analysis (the method used was Wilks's Lambda). A $p<0.05$ was considered statistically significant.

Results

The average rates for measured indicators of patients with prostate cancer obtained as a result of diagnosis are presented in Tables II-V. Table I provides empirical data demonstrating basic world assumptions of men with favorable disease course and adverse disease course as well as normative value for the scales.

Respondents with unfavorable prognosis for a disease (acceleration of the disease, relapse, generalization) are convinced of their luck, justice and benevolence of the world, and have a positive self-image; they have strong belief in the possibility of controlling what is happening. When comparing received rates with normative values, it was found that, regardless of the disease prognosis, men with prostate cancer are more convinced of the security of the world, its friendliness, they tend to be sure that they are lucky men. Table III provides the results of the study on respondents' ways of coping.

Referring to the data received, it may be noted that men diagnosed with prostate cancer of favorable prognosis tended to resort to a confrontational approach in problem solving. Apart from that, on the one hand, they used the coping strategy of

Table II. The arithmetic means of basic world assumptions in men with prostate cancer.

	The arithmetic mean (standard deviation)		
Basic world assumptions	**Respondents with a favorable disease course**	**Respondents with an unfavorable disease course**	**Normative value**
Benevolence	35.1 (4)	36.4 (6,9)	31.9 (5.1)
Justice	22.2 (4.6)	23 (4)	22.6 (3.6)
Self-Worth	26.4 (3.6)	28.5 (6.6)	25.2 (3.2)
Luck	29.9 (6.7)	31.2 (5.5)	27.3 (3.3)
Controllability	24.1 (5.7)	26.6 (3.8)	25.9 (3.6)

avoidance, on the other hand, they planned steps to solve the emerging problems. Respondents with poor prognoses while handling stress resorted accepting responsibility as well as seeking social support and distancing from problems.

The next step was the analysis of the indicators of the quality of the men's life. The results are summarized in Table IV.

Scales of Role-Physical (RP) and Role-Emotional Function (RE) reflect the role of physical and emotional problems in the disability situation of a person. Because of the poor prognosis of the general health of men with prostate cancer, their emotional condition dramatically reduces the productivity of problem solving in daily life, and lower work performance. The respondents of this group showed low rates for such indicators as of the quality of life compared to the respondents with a favorable prognosis, except for Scale of Social Functioning (SF). The mentioned scale evaluates the level of satisfaction with one's activity in social contacts, and communication. The men with a favorite prognosis tended to limit social contacts, this is due to their physical and emotional condition. The results of an assessment of the level of subjective control in men with prostate cancer are given in Table IV.

The normative value of the subjective control is equivalent to 5.5 sten. With that in mind, it may be noted that the men with prostate cancer have an external locus of control: they are inclined to attribute life events and occurrences to external circumstances, in particular, to the fate, luck, help from others.

The exception to this trend is the scale of internality in terms of relations of production, in which we witnessed more of internal locus. Thus, the respondents tend to attribute more importance to their own efforts, to consider their actions a cause of success and failure. While studying the men's viability, the range of features was identified (Table VI).

Based on the data received, it may be noted that hardiness was expressed less in men with prostate

Table III. The arithmetic means of ways of coping in men with prostate cancer.

	The arithmetic mean (standard deviation)		
Ways of coping	**Respondents with a favorable disease course**	**Respondents with an unfavorable disease course**	**Normative value**
Confrontation	9.6 (3)	8.2 (3)	8.9 (2.7)
Distancing	8.4 (3)	9.2 (2.6)	8.6 (3)
Self-control	12.8 (4.8)	12.5 (3.9)	13.6 (3)
Seeking social support	10.5 (4.6)	11.1 (7.3)	10.6 (3.1)
Accepting responsibility	7.1 (1.9)	7.5 (2.6)	7.3 (2.1)
Avoidance	10.8 (3.4)	9.9 (4.1)	10.5 (3.5)
Planning the steps to solve the problem	12.3 (3.9)	11.7 (3.7)	12.7 (2.8)
Reinterpreting the stressor as a positive	12 (5.7)	11.6 (4.1)	12.3 (3.4)

Table IV. The arithmetic means of indicators of the life quality of men with prostate cancer.

Indicators of the quality of life	The arithmetic mean		
	Respondents with a favorable disease course	Respondents with an unfavorable disease course	Normative value
Physical Functioning (PF)	60	60	77
Usual role activities caused by physical health problems (RP)	52.2	20.3	53.8
Bodily Pain (BP)	62.8	49.9	61.3
General health perception (GH)	49.2	44.1	53.5
Vitality (VT)	49.1	48.2	55.1
Social Functioning (SF)	62.5	69.5	69.6
Usual role activities caused by emotional problems (RE)	54.5	36.4	57.2
Mental Health (MH)	62.1	57	58.8

cancer compared with the normative values of the scales. Furthermore, concerning single indicators of hardiness, it may be discovered that engagement and the conviction of the need to get involved, is higher in men with a favorable disease course rather than in men with a poor prognosis. The indicator "Accepting risk" represents one's belief that life events foster development and contribute to getting new valuable experience that is worth risking. The prostate cancer patients have a higher level of accepting risks compared with other indicators of hardiness, which might be related to life situation of the respondents, that is, fighting with a life-threatening disease.

The analysis of data received while studying patients' life orientation demonstrates that men with prostate cancer are more pessimistic (M=49 and M=56.2 for the respondents with favorable prognosis and poor prognosis respectively whereas the normative value is estimated from 80 and higher). Life orientation is a relevantly stable personal characteristic. On the one hand, the received data allow us to assume that distinct pessimism is a risk factor for prostate cancer; on the other hand, pessimism might be considered a reaction to the disease. These assumptions require further research.

Discussion

In terms of the psychological characteristics of men diagnosed with prostate cancer the following findings must be mentioned. The respondents are convinced of the benevolence of the world and their luck; however, they have a rather low level of hardiness and distinct pessimism. The men, while handling stress, use variable coping strategies,

Table V. The arithmetic means of indicators of subjective control in men with prostate cancer.

Indicators of subjective control	The arithmetic mean (sten scores)	
	Respondents with a favorable disease course	Respondents with an unfavorable disease course
General internality	12.2 (4)	14.5 (4)
Internality in terms of achievements	4 (5)	4.2 (5)
Internality in terms of failures	-0.6 (3)	2.5 (4)
Internality in terms of family relationships	-1.3 (2)	0.8 (3)
Internality in terms of relations of production	7.9 (7)	6.2 (6)
Internality in terms of interpersonal relations	0.6 (5)	1 (5)
Internality in terms of health and diseases	0.5 (3)	0.4 (3)

Table VI. The arithmetic means of hardiness indicators in men with prostate cancer.

Indicators of hardiness	The arithmetic mean		
	Respondents with a favorable disease course	Respondents with an unfavorable disease course	Normative value
Engagement	26.6 (11.5)	17.5 (12.5)	37.6 (8)
Control	24.8 (8.4)	23.8 (8.8)	29.1 (8.4)
Accepting risk	15.6 (5.8)	16.4 (8.1)	13.9 (4.3)
Hardiness	67 (18.6)	57.8 (21.5)	80.7 (18.5)

Table VII. Wilks's Lambda coefficient, F-test and significance levels.

Discriminant variables	ƛ	F	*p*
Engagement	0.954	4.599	0.039
Internality in terms of failure	0.948	6.867	0.003
Usual role activities caused by physical health problems (RP)	0.834	6.819	0.001
Controllability	0.976	3.449	0.001

nevertheless it is crucial to note that the patients with a favorable disease course resort to more active coping compared with the patients with a poor prognosis. Apart from that, the latter group of patients has much lower rates of indicators of the quality of life, which limit their livelihood. Also, cancer-related fatigue is a common symptom experienced by cancer patients and deeply affects every aspect of quality of life[23].The role of psychological aspects in improving the quality of life in patients with prostate cancer is indicated by the study of Pirnia et al[24] in which improvement in sleep quality and reduction in fatigue ($p<0.01$) were achieved with aromatherapy in relation to psychological measures[24].

In order to determine a set of psychological predictors connected with favorable and adverse course of prostate cancer, discriminant analysis was conducted (Table VII). The method used was Wilks's Lambda. Table VI presents the results row the analysis characterizing differences in each variable under study for the groups of men with different prognosis.

Thus, with a help of discriminant analysis, we determined the range of discriminant variables classifying the sample of patients. A favorable prognosis for the patients is associated with the following: high engagement rates as an indicator of stoicism level; blaming failures on external factors; the absence of everyday life limitations that may have been caused by physical conditions otherwise; and low rate of controllability. In addition, patient's engagement in his own life contributes to sooner remission and stabilization of the disease and events, such as interest in his own activity, or realization that not everything can be under person's control.

The discriminant function, which consists of the above-mentioned variables, describes 100% dispersion, at $ƛ=0.472$ and $p=0.001$ it indicates that the set of variables has good predictive quality. Apart from that, assessing coefficients for discriminant functions, we may note that engagement (1.018), internality in terms of failures (-0.717) and role functioning caused by physical health problems (0.599) widely contribute to the development of prostate cancer.

Conclusions

To summarize, during the research, the set of psychological predictors correlated with favorable and unfavorable disease course of prostate cancer was received. The psychological features of the patients can modulate the disease course, have a profound impact on patents' wellness. Received set of predicative indicators of the disease course is the preliminary results of the pilot study. However, the data received may already be used in psychosocial and psychotherapeutic practice for the patients diagnosed with prostate cancer.

Better understanding of prostate cancer is the key to opening new possibilities in a personalized approach in cancer treatment, to obtaining positive results in treatment and increasing its efficiency.

Conflict of Interest
The Authors declare that they have no conflict of interests.

Ethics Approval
This study was approved by the Committee on Bioethics of Tomsk State University [date: 11/02/2021, No. 5 (7)].

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Authors' Contributions
All authors have contributed equally to all aspects of this study.

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

Informed Consent
Informed consent was obtained from all participants included in the study.

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