PSYCHOLOGICAL FACTORS OF ONCOLOGICAL MORBIDITY IN WOMEN LIVING IN AN INDUSTRIAL METROPOLIS

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Abstract: In the structure of oncological morbidity among women, breast cancer occupies a leading position both in Russia and around the world. This study aims to study the contribution of psychological and environmental factors to the risk of breast cancer in women living in an industrial metropolis. During the study, it was found that the following psychological risk factors can be considered: reduced indicators of the worldview, rare use of the coping strategy "Escape-avoidance", reduced indicators of quality of life, external locus of control in the field of failures, family and interpersonal relationships, general internality, as well as a reduced indicator of resilience. The results obtained can be included in the development of personalized breast cancer screening protocols.

Keywords: breast cancer, basic beliefs, coping behavior, resilience, locus of control, life orientation, quality of life, oncopsychology, oncological morbidity.

1 Introduction

Malignant neoplasms are one of the main causes of death, disability, deterioration of the quality of life and an important obstacle to increasing life expectancy in every country in the world. According to the World Health Organization estimates in 2019, malignant neoplasms occupied leading positions in the structure of causes of death under the age of 70 (Ferlay et al., 2020). Every year, more than one million (in our country more than 70 thousand) primary breast tumors are registered in the world. Mortality from this disease does not exceed mortality from cardiovascular diseases, or lung cancer in women. But the proportion of deaths from breast cancer in women aged 35-55 years is significantly higher than the mortality of women from cardiovascular diseases and lung cancer, which falls on the average age of women 60-85 years (Ferlay et al., 2020). These data emphasize the necessity to search for risk factors for both the disease and the course of breast cancer, the description of risk models for their inclusion in breast cancer control programs. Women at high risk of breast cancer should be offered more intensive monitoring and preventive measures. An accurate and individual assessment of the risk of the disease is central to decision-making regarding the prevention strategy. This requires testing prognostic models at the population level that can classify women into risk groups for breast cancer. However, this requires the identification and study of risk factors that could be included in these predictive models. In studies, scientists have noted the mediated morbidity and survival of individuals with cancer diagnosis by the social and psychological characteristics of the latter (Bahrami et al., 2018; Bray, 2021; Carver et al., 1994). However, scientists have not yet been able to identify specific social mechanisms and factors leading to the development of malignant neoplasms, the results obtained are ambiguous and sometimes contradict each other.

2 Literature Review

According to global cancer statistics (Ferlay et al., 2020), genetic factors (including the main susceptibility genes (BRCA1, BRCA2)) account for about 10% of breast cancer cases in developed countries, but their prevalence among the population is too small to explain most of the differences in the risk of morbidity among women. Consequently, differences in the risk of morbidity may be the result of different environmental, social and psychological factors. In medical sociology, social models of disease are described that link health status and socio-economic indicators of life on a large scale. According to sociological research, the urban population is more prone to cancer than the rural population. A person's place of residence can affect health, the course of illness due to such indicators as air and water quality, solar activity in the region, proximity to industrial facilities that produce or store hazardous substances, accessibility of social facilities (medical institutions, including the quality of services, sports facilities). The impact of carcinogenic and man-made environmental factors in an industrial metropolis, the processes of urbanization that change the lifestyle, the increasing pace of life and the information load have an impact on the increase in morbidity among residents of megacities (Kiku et al., 2017; Radkevich et al., 2018). Oncological diseases are considered as an indicator of the ecological disadvantage of the territory. In Chelyabinsk region of the Russian Federation, with a nuclear catastrophe in its history and with specific environmental problems, an unfavorable situation has developed over the past decades for the spread of oncological diseases.

Investigating the population aspect of breast cancer risk factors, N. E. Kosykh and S. Z. Savin (2009) note that in some cases territorial differences in the incidence of breast cancer within one country are explained by the unequal ethnic composition in its different territories, differences in lifestyle, eating habits, the state of reproductive function of different nationalities. The state of health can also be mediated by the peculiarities of social relationships, the presence/absence of external support. In addition, the availability and quality of medical services and employment opportunities depend on the place of residence, which can also affect the state of health, mediating the need for residents to earn a living. The economic characteristics of the regions of residence can create and strengthen socio-economic differences, peculiarities of behavior in the situation of illness.

In addition to the social prerequisites for the development of malignant neoplasms, a number of studies have described psychological factors of breast cancer in women (Revidi, 1983; Tsiring et al., 2019; Tarabrina, 2014; and many others). As psychological risk factors for breast cancer, the authors identify restraint in the manifestation of emotions, a pronounced sense of guilt and self-doubt, an external locus of control and low importance of the value of health (Gibek & Sacha, 2019), unproductive coping strategies, feelings of hopelessness and helplessness, rigidity of attitudes (Carver et al., 1994), feelings of despair and depression (Zenger et al., 2011) and others.

This study is aimed at studying the contribution of psychological and environmental factors to the risk of breast cancer in women. As psychological predictors, such as basic beliefs, life orientations, locus of control, coping behavior strategies and subjective assessment of quality of life, indicator of subjective age, personal helplessness-independence, resilience are identified. The place of residence of women with breast cancer is considered as an environmental factor – an urban area.

3 Research Methodological Framework

In this regard, the aim of this study was an empirical analysis of the contribution of predicative markers determining the morbidity of women with luminal breast cancer living in an industrial metropolis. Research objectives: to conduct

discriminant analysis in order to determine psychological predicative markers of cancer; to carry out quantitative and qualitative interpretation of the data obtained.

The methods of diagnosis of psychological predictors of morbidity were: the scale of basic beliefs (Padun & Kotelnikova, 2008), the questionnaire "Methods of coping behavior" (Kryukova, 2010); the methodology of the level of subjective control (Bazhin et al., 1984); the test of life orientation (Tsiring & Evnina, 2013), the test of resilience (Leontiev & Rasskazova, 2006), Quality of Life Questionnaire (SF-36), (Ware et al., 1993). Methods of quantitative processing of empirical data: methods of descriptive statistics, discriminant analysis (Nasledov, 2012). The design of the study involves an analysis of the psychological characteristics of women with breast cancer at various stages of the disease (N=138), who first applied for professional medical care at the Chelyabinsk Regional Clinical Center of Oncology and Nuclear Medicine. The study was conducted between March 2020 and September 2020.

4 Results and Discussion

In order to determine the totality of psychological predictors that are associated with the risk of breast cancer in women living in a megalopolis, we conducted a discriminant analysis, the results of which are shown in Tables 1-4. As a method, Wilks method was used, referring to the step-by-step method. Table 1 shows the average values of psychological variables, the coefficient (Wilks Lambda), the F-criterion and the level of significance, characterizing significant differences in each of the presented variables for groups of women living in urban areas, diagnosed with breast cancer, as well as healthy.

Table 1 Average values, lambda Wilks coefficients, F-criteria and significance levels

Discriminant variables	M_1	M_2	λ	F	P
The scale of basic beliefs (Padun & Kotelnikova, 2008)					
Self-image	29,19	31,3	0,954	8,114	0,005
Luck	32,4	34,9	0,956	7,862	0,006
The belief about control	25,83	27,1	0,976	4,665	0,03
Questionnaire "Methods of coping behavior" (Kryukova, 2010)					
Escape-avoidance	11,56	13,3	0,960	6,998	0,009
Planning	11,69	12,6	0,968	5,524	0,02
Positive revaluation	12,62	14,17	0,956	7,830	0,006
Quality of Life Questionnaire (SF-36), (Ware et al., 1993)					
PF	63,93	87,76	0,718	66,524	0,001
RP	39,5	75,44	0,834	38,39	0,001
BP	59,53	70,78	0,947	9,429	0,002
GH	52,95	65,57	0,914	15,945	0,001
VT	50,04	61,47	0,920	14,628	0,001
SF	61,7	74,77	0,923	14,172	0,001
RE	41,08	65,47	0,914	15,866	0,001
MH	47,58	64,25	0,849	29,959	0,001
The methodology of the level of subjective control (Bazhin et al., 1984)					
General internality	11,4	20,68	0,948	9,325	0,003
Internality in the sphere of failures	0,77	3,87	0,954	8,066	0,005
Internality in family relationships	-0,65	2,03	0,948	9,271	0,003
Internality in the sphere of interpersonal communication	1,25	2,42	0,971	4,996	0,027
The test of resilience (Leontiev & Rasskazova, 2006)					
Risk taking	14,97	13,09	0,975	4,282	0,04
M1 – average values of indicators of psychological characteristics of women with breast cancer living in the city. M2 – average values of indicators of psychological characteristics of women without cancer diagnosis living in the city.					

Source: authors' own processing

According to the results of the diagnosis of life orientations (the test of life orientations (Tsiring & Evnina, 2013)), no significant

differences were found among women with and without an oncological diagnosis.

Let's move on to the interpretation of the data obtained in the course of discriminant analysis. The results show that indicators of the worldview (basic beliefs), coping strategies, indicators of quality of life, indicators of the locus of control, as well as an indicator of resilience - risk acceptance are associated with the fact of breast cancer. Psychological characteristics acting as discriminant variables, indicated in Table 1, act as variables for which differences between groups of healthy women and women with breast cancer living in urban areas are statistically significant.

Referring to the average values of psychological characteristics of women with cancer and conditionally healthy, it can be argued that a more positive picture of the world is a kind of protector that prevents breast cancer: healthy women have indicators of basic beliefs about their own value and significance, luck and ability to control the events of their own lives statistically higher than women with cancer.

A number of coping strategies act as a preventive factor and reduce the risk of breast cancer. We are talking about such coping strategies as escape-avoidance, planning and positive reassessment. These coping strategies are more pronounced in healthy women living in an urban environment. The escape-avoidance strategy, which consists in avoiding the individual from solving difficulties independently, is interpreted by most researchers as maladaptive, but it has some positive effect, in particular, it is able to quickly reduce emotional tension in a stress situation, which allows a woman not to accumulate negative experiences for a long time. Problem-solving planning, which is more typical for healthy women than for women with breast cancer, manifests itself in attempts to overcome problems through a purposeful analysis of the situation, women belonging to a healthy sample develop strategies for solving the problem, plan their own actions, taking into account objective conditions, past experience and available resources. Positive reassessment is also more typical for healthy women, and involves overcoming negative experiences through a positive rethinking of the problem, considering a difficult situation as an incentive for personal growth. These positive effects from the use of these coping strategies, apparently, allow women to maintain psychological well-being and somatic health.

The subjective assessment of the quality of life is significantly higher in women without an oncological diagnosis. It follows from this that reduced physical and psychological components of health are risk factors for breast cancer in women living in a megalopolis. The subjective locus of control as the degree of readiness of an individual to take responsibility for what is happening around him also significantly differs in women with breast cancer and healthy women. However, it should be noted that despite the significant differences in the indicators of the level of subjective control, most indicators correlate with externality in accordance with the norms of the methodology. Thus, women with an oncological diagnosis are more likely to have an external locus of control in the field of failures, family relationships, and also, in general, women do not see a connection between their actions and significant events in their lives, do not consider themselves able to control their development and believe that most events are the result of an accident or the actions of other people. In the field of interpersonal relations, healthy women are characterized by an internal locus of control, whereas women with breast cancer are characterized by an external one, that is, the latter do not consider themselves capable of actively forming their social circle and tend to consider their relationships the result of the actions of their partners.

Considering the indicators of resilience, we state that in healthy women, risk acceptance is significantly higher (M=17) than in women with a fatal diagnosis of breast cancer (M=15.2). Risk-taking manifests itself as a conviction that it is possible to gain important knowledge and experience from everything that

happens in life, women are active, ready to act in the absence of guarantees of success (Leontiev, 2010).

Table 2 shows the values of the discriminant function, which is informative and explains 100% of the variance, and also with a value of λ=0.641 and a statistical significance of p=0.001, indicates that the set of discriminant variables has a good discriminative ability.

Table 2 Basic statistics of the canonical discriminant function

Function	Proper value	% of the explained variance	Total %	Canonical correlation	λ	Chi-square	p
1	0,559	100	100	0,599	0,641	74,2	0,001

Source: authors' own processing

According to the data obtained, the risk of women living in urban areas with breast cancer depends on their worldview (Self-image, Luck, Belief about control), coping strategies used in difficult life situations (Escape-avoidance, Planning, Positive Reassessment), quality of life indicators, indicators of the locus of control, as well as risk acceptance. However, not all of the above variables were included in the discriminant equation, which is due to taking into account not only their discriminative ability, but also their unique contribution to the aggregate with the rest of the variables. Table 3 shows the coefficients of the canonical discriminant function.

Table 3 Coefficients of the canonical discriminant function

Function	Escape-avoidance	RP	MH	PF
1	0,418	0,332	0,374	0,554

Source: authors' own processing

The coefficients of the canonical discriminant function indicated in Table 3 characterize the contribution of each variable to the value of the discriminant function, taking into account the influence of the other variables. Thus, the greatest contribution to the value of the discriminant function that divides women into healthy and women with cancer diagnosis is made by the quality of life indicator "Physical functioning" (PF), the coping strategy "Escape-avoidance", quality of life indicators "Mental health" (MH), and "Role functioning due to physical condition" (RP) (variables are ordered by absolute value).

Table 4 shows the combined intra-group correlations between discriminant variables and the standardized canonical discriminant function.

Table 4 Structural matrix

Indicator	Function
PF	0,839
RP	0,637
MH	0,563
Escape-избегание	0,272

Source: authors' own processing

The variables are ordered by the absolute value of the correlation in the function. Thus, the greatest absolute correlation is observed between the discriminant function and the quality of life indicator "Physical functioning", which contributes to the differentiation of women into sick and healthy (0.554), and is also associated with the discriminant function (0.839).

The discriminant equation includes coping strategies such as escape-avoidance (0.392) and distancing (0.284). As already described above, the escape-avoidance strategy manifests itself in behavior as a person's avoidance of self-solving difficulties, decision-making. Healthy women use this strategy more often, quickly reducing their emotional stress. The reduced indicators of this coping strategy can be regarded as a risk factor for breast cancer for women living in an urban environment.

The indicators of quality of life "Mental health" (-0.394) and "Role functioning due to physical condition" (-0.192) were reduced in women with breast cancer. Low indicators of mental health indicate the presence of depressive, anxious experiences,

mental distress, and low indicators of role functioning due to physical condition indicate a significant restriction of daily activities by physical condition, in addition, their low indicators can be regarded as risk factors for breast cancer.

As the classification results show, with this set of discriminant variables, the classification accuracy is 77.1%, which is quite effective for classifying two classes of objects.

5 Conclusion

During the study of psychological risk factors for breast cancer of women living in an industrial metropolis, a number of data were obtained indicating that the following psychological characteristics of a person can be considered as psychological risk factors: reduced indicators of the worldview (Self-image, Luck, Belief about control), rare use of the coping strategy "Escape-avoidance", reduced indicators of quality of life, external locus of control in the sphere of failures, family and interpersonal relationships, general internality, as well as a reduced indicator of resilience - risk taking. The greatest contribution to the differentiation of healthy women and women with breast cancer is made by indicators of quality of life - Physical functioning, Role-based functioning due to physical condition, Mental health and coping strategy "escape-avoidance". Physical functioning and Role-based functioning due to physical condition are physical components of health. This is the scope of the efforts of oncologists aimed at the effectiveness of treatment. Mental health, being a psychological component of health related to mood, the presence of depression, anxiety, as well as the use of coping through the "Escape-avoidance" strategy, are subject to correction by psychological service specialists. The results obtained can be included in the development of personalized breast cancer screening protocols, as well as taken into account in risk assessment, when classifying women into risk groups for breast cancer. However, this requires the development and verification of predictive models.

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