



Social risk factors of incidence and disease course in women having breast cancer: review of studies

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Abstract

Breast cancer is an oncological disease ranking the world's first according to prevalence. This oncological pathology leads to a lower quality of life in women, their work incapacity, disability, and death. Searching for risk factors has to be conducted in relation to both the incidence and the disease course of breast cancer, and risk models have to be verified for including them into breast cancer control programs. The methods of this study were theoretical review, analysis of literature, and methods for systemizing and summarizing the material. The presented review of studies of social risk factors of breast cancer occurrence demonstrates the prognostic incidence risk models currently available in medical sociology. As for the incidence of malignant neoplasms, individual social risk factors have been identified: place of residence, economic characteristics of the region of residence, education level, family status, etc. The significance of these factors for estimating the incidence risk of malignant neoplasms has been described, too. The obtained data on social risk factors of the disease incidence and course in female breast cancer patients serve as a basis for developing new predictive models of the risk of oncological diseases aimed at identifying the risk groups, early diagnosing of breast cancer, as well as including them into breast cancer control programs.

Keywords: oncological psychology, breast cancer, incidence risk factors, risk model, screening, social factors

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INTRODUCTION

Breast cancer is the most widespread form of cancer in women. Mortality due to this chronic disease does not exceed that due to cardiovascular diseases or lung cancer in women. However, the percentage of mortality due to BC among women aged 35-55 is much higher than the women's mortality due to cardiovascular diseases and lung cancer falling for those aged 60-85 on average (Parkin et al., 2005). These data highlight the necessity of searching for risk factors both for incidence and disease course of breast cancer, describing risk models for including them into breast cancer control programs. Closer observation and prevention measures have to be offered to women having a high risk of breast cancer. The central part in decision-making as for the prevention strategy belongs to the precise and personalized assessment of the disease risk. With regard to this, the objective of this research is analyzing the data on social risk factors of incidence and course of breast cancer. The review of studies dealing with social risk factors is designed to identify the principal focus areas in views on the factors of breast cancer occurrence, course, and survival of

female patients and to supply data for risk assessment to practicing physicians and psychologists.

Numerous studies show how the attention to social and economic factors has led to describing the key cancer mortality trends. Results of the presented studies confirm that recognizing social risk factors in studies of cancer etiology and its course may point to new hypotheses which otherwise could have been overlooked.

There is a growing interest in developing more personalized breast cancer screening protocols based on risk assessment. This requires the population-level check of practical models that can classify women into breast cancer risk groups. However, for this, risk factors that could be included into the said predictive models have to be identified and studied, first of all. In their research works, scientists note the incidence and survival of individuals diagnosed with oncological diseases being mediated by their social particularities

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(Avison & Gotlieb, 1994; House, Landis & Umberson, 1988; Lehto, 2005). However, so far, scientists have failed at identifying particular social mechanisms and factors resulting in the development of malignant neoplasms; the obtained results are ambiguous and contradict each other sometimes. Proceeding from the above, the authors believe it important and relevant to systemize the data available in science on the problem of social determination of oncological diseases.

LITERATURE REVIEW

Screening and early diagnosing of breast cancer in high-risk group can substantively mitigate the threat to women's health and enhance the efficiency of treatment, so early diagnosing and screening are of decisive importance. It should be noted that foreign sources cite numerous studies of the most diverse social risk factors of breast cancer incidence: ethnicity (Shariff-Marco, Yang & John, 2015), sexual identity and orientation (Dibble, Roberts & Nussey, 2004), poverty and discrimination, lack of trust in the healthcare system, place of birth or immigration status, availability of one's own housing, and so on (Shariff-Marco, Yang & John, 2015). The presence of family is also considered to be a social risk factor for the development of oncological diseases and within the context of cancer patients' survival. Here, results of O.N. Sharova's (2017) study should be mentioned. The data obtained by the author confirm that the experience of family life, both positive and negative (divorce, death of a spouse) one, plays a more positive part in prolific coping with an oncological disease situation as compared to the absence of such experience (Sharova, 2017).

However, it is not always that these factors are included in assessing the incidence risk, and they are not paid due attention when forecasting the disease course and survival of breast cancer women. Medical sociology disposes of incidence risk measurement models of varying forecast precision which incorporate combinations of factors: age, body weight index, hormonal and reproductive factors, family anamnesis, and others. Among such risk forecast models, the Gail model (NCI – Gail model) (Gail et al., 1989), the Claus model (Claus, Risch & Thompson, 1994), the BRCAPRO model, and the Tyrer – Cuzick model (Zhang et al., 2018) are well-known, alongside some others. These risks forecast models feature good predictive power in general, but they do not include social risk factors of the disease. So, Gail's model pays the principal attention to non-genetic risk factors: the age of the first pregnancy and childbirth, the quantity of previous breast biopsies, and the quantity of the first degree relatives having breast cancer. Claims were voiced against this model for including the first degree relatives only while excluding ethnicity (Nickson et al., 2018). The Claus model, or so-called family breast

cancer risk model was obtained using a large-scale population study; it has demonstrated that the influence of genotype on the breast cancer risk depends on women's age. However, the Claus model does not incorporate any non-hereditary risk factors, which is considered to be its disadvantage. Findings show that the Tyrer – Cuzick model has the highest average risk values for forecasting the five-year risk of breast cancer.

So, using the case of popular predictive models, one can conclude that social factors are taken into account in risk assessment not always and not to the same extent as the clinical ones, which can lead to losing the opportunity of reducing distinctions in relation to the extent of incidence risk among breast cancer women. The precision of risk assessment can be enhanced by verifying social factors.

RESEARCH METHODOLOGICAL FRAMEWORK

The objective of research presented in this published work is analysis of the data on social risk factors of incidence and course of breast cancer. The research tasks making the objective more precise were the following:

1. Theoretical analysis of the concept of social factors, including the social risk factors of malignant neoplasms incidence.
2. Studying the predictive models available in medical sociology and their variables.
3. Analyzing the data on particular social risk factors of malignant neoplasms incidence (place of residence, economic profile of regions, ethnicity, the level of education, economic welfare, etc.).

The principal methods of this study were the theoretical review and analysis of literature sources, and methods for systemizing and summarizing the material.

As the research material, the authors used scientific published works about social risk factors of cancer incidence, in particular, those of breast cancer, taken from various databases: PubMed, NCBI, annualreviews.org, Google Scholar, Elibrary.ru, APA Psycnet, and others.

RESULTS AND DISCUSSION

Social factors are non-biological individual level factors influencing health, such as ethnicity, economic welfare, level of education, family status, place of residence, employment, etc. (Dean et al., 2018).

According to the global cancer statistics (Parkin et al., 2002), genetic factors (including the principal susceptibility genes (BRCA1, BRCA2) amount to around 10% of breast cancer cases in the developed countries, but their incidence in the population is too low to explain the greater part of distinctions in the risk among women. Therefore, the majority of distinctions in the incidence risk must be a consequence of various impacts of the

environment and social factors. This assumption finds its confirmation, e.g., in studies of migrants that show that the breast cancer incidence grows after migrating from the low incidence countries to the high incidence ones, especially if this takes place at a young age.

In medical sociology, social models of incidence were described that associate health with social and economic status on a large scale. Let the data on the principal social risk factors of malignant neoplasms incidence be given.

Women's places of residence can affect their health and course of diseases due to their physical features, such as the quality of air and water, solar activity in the region, proximity to industrial object producing or storing hazardous substances, accessibility of social objects (medical institutions, with the quality of services included, sports facilities), and others. First of all, one should pay attention to industrial regions with the developed heavy equipment industry where toxicity of the environment is quite high, and, respectively, so are the incidence risks of malignant neoplasms. So, for example, as an industrial region having had a nuclear disaster in its history, Russia's Chelyabinsk region is among the areas having high cancer incidence figures. In the USA, they studied the effect of the sun rays on the population's mortality due to breast cancer, ovarian cancer, colon and prostate cancers. So, as a result of the research, it was found that the sun rays led to breast cancer (according to Frantsuzova, 2019).

Economic characteristics of the regions of residence can create and enhance social and economic distinctions, behavioral particularities in the situation of illness. Health is determined by social relationships and support, too. For example, in the rural areas, the social links between residents are stronger. It is on the place of residence that the accessibility and quality of medical services, employment options depend which can also affect health – e.g., by shaping the opportunities for people to earn their living. Speaking about breast cancer, it has to be noted that a widespread issue is seeking medical assistance at later stages of the disease plus the inaccessibility of diagnosing. When studying the population aspect of breast cancer incidence risk factors, N.E. Kosykh and S.Z. Savin (2009) point out that in a number of cases, area-depending distinctions in the BC incidence within one country are explained by the non-uniform ethnic composition in the country's different areas, distinctions in the pattern of life, food habits, and the condition of reproductive function in different nations. The urban BC incidence levels are known to considerably exceed the similar indicators for the rural areas. Meanwhile, for some areas, local distinctions of incidence can be explained by the different number of the urban and rural population in them. However, it is noted that women residing in the country are less informed about the early diagnosing of breast cancer (Shumel & Tishchenko,

2016). In the USA, numerous studies have found that the breast cancer survival rate is lower in black women than in the white ones. The reason behind these distinctions is still unclear: it could be the social or the genetic factor. Anyway, studies show that social determinants of health play a great part in explaining race-related distinctions in the outcomes of breast cancer (Roseland et al., 2017). Social and economic deprivation as a cause of higher breast cancer mortality risk in African American and Latin American women has been studied. They are more likely to be diagnosed a protracted disease than the white American women, i.e., African American and Latin American women seek medical care at later stages, which is a predictor of an unfavorable course of the disease. Alongside this, among white women, social deprivation is associated with a bad forecast for breast cancer, higher incidence level of high-grade estrogen receptor negative tumors (ER) that are similar to triple negative breast cancer cases observed in African Americans and Latin American women (Vona-Davis & Rose, 2009).

In the study by the National Cancer Institute (USA), when estimating social risks of oncological diseases, it was shown that a higher cancer incidence coefficient was observed in people having an education lower than secondary one, as compared to their peers having got a higher education. Alongside this, the cancer incidence coefficient in people having a lower family income per year exceeded the one in people having higher incomes (Farley & Flannery, 1985). Moreover, lower income was associated with a statistically significant increase in the long-term breast cancer risk among women, too. The studies also measured the incidence coefficients depending on the family status, employment status, the nature of work and position held, rural or urban residence. A significant growth in oncological diseases is observed associated with the divorce or separation of spouses, as well as with unemployment. In divorced or separated men and women, the cancer incidence level was higher (1,83) than in their married peers (1,34). As compared to married women, those who were divorced or never married had a higher risk of malignant neoplasms. The same trend can be traced in unemployed men and women as compared to their working peers. Meanwhile, broken down to the types of cancer, the incidence indicators did not differ essentially depending on the rural or urban places of residence (Klegg et al., 2009). A lower income level was statistically significantly associated with a higher probability of being diagnosed with a later stage of breast cancer. The probability of newly diagnosed late-stage breast cancers in women having the lowest income is 1,8 times as high as in the group of women with the highest income. Based on these incidence data, the forecasts have shown that women with a lower social and economic status as compared to the higher social and economic status ones have a higher level of

expected breast cancer mortality. They also have a higher percentage of deaths considered avoidable with the help of early detection. The level of avoidable deaths in women with a lower social and economic status was 2,5 times higher than in the better off women.

The data obtained during analysis of studies discussing social risk factors of breast cancer incidence confirm that the following ones have to be listed among the principal factors: social and economic status (economic welfare, the level of education) (Clegg et al., 2009), family status, and place of residence. Consideration of joint action of the social factors under study can help in understanding the cancer incidence risk conditioned by numerous social determinants of health. The obtained data can be of use in running cancer prevention and control programs. As the analysis has shown, special attention should be paid to women having lower social and economic status (Farley & Flannery, 1989) in the early breast cancer diagnosing programs.

CONCLUSION

Thus, analyzing the data on social risk factors of breast cancer incidence contained in published works has allowed finding out the principal lines of studying the BC predictors, as well as difficulties in estimating the disease course forecast.

The described data on social factors viewed as predictors of breast cancer incidence in women that have been amassed by the world science lead to the conclusion about the data being controversial and not systemized. The problem can be solved by introducing classification and typology of social risk factors and developing a breast cancer risk estimate model. This model could incorporate such predictors as the place of residence (urban/rural locality; industrial areas), ethnicity, economic welfare indicators, the level of education, family status, and the work activity type. Such a model would contribute to differential evaluation of breast cancer incidence risk, which, in its turn, would ensure the personalized approach to prevention and treatment, early diagnosing and breast cancer screening. A prospect for further research is plotting a model for assessment of social predictors of incidence and disease course, its verification, and evaluating the predictive power of the model.

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REFERENCES

- Avison WR, Gotlieb IH (1994) Stress and mental health. Contemporary issues and prospects for the future. New York: Plenum Press.
- Claus EB, Risch N, Thompson WD (1994) Autosomal dominant inheritance of early-onset breast cancer. Implications for risk prediction. *Cancer*, 73(3): 643-51.
- Clegg LX, Reichman ME, Miller BA, Hankey BF, Singh GK, Lin YD, Goodman MT, Lynch CF, Schwartz SM, Chen VW, Bernstein L, Gomez SL, Graff JJ, Lin SK, Johnson NJ, Edwards BK (2009). Impact of socioeconomic status on cancer incidence and stage at diagnosis: selected surveillance results, epidemiology and outcomes: the National Longitudinal Mortality Survey. *Cancer Causes & Control*, 20(4): 417-435.
- Dean LT, Gelert S, Neuhauser ML, Zanetti K, Goodman M, Thompson B, Viswanathan K. & Schmitz KX (2018) Social factors play a role in cancer risk and survival. *Cancer Causes & Control*, 29(7), 611-618.
- Dibble SL, Roberts SA & Nussey B (2004) Comparing breast cancer risk between lesbians and their heterosexual sisters. *Women's health issues: official publication of the Jacobs Institute of Women's Health*, 14(2): 60-68.
- Farley TA, Flannery JT (1989) Late-stage diagnosis of breast cancer in women of lower socioeconomic status: public health implications. *American Journal of Public Health*, 79(11): 1508-1512. <https://doi.org/10.2105/AJPH.79.11.1508>
- Frantsuzova IS (2019) Analysis of breast cancer development risk factors. *International research journal*, 3(81), 68-74.
- Gail MH, Brinton LA, Byar DP, Corle DK, Green SB, Schairer C, Mulvihill JJ (1989) Projecting individualized probabilities of developing breast cancer for white females who are being examined annually. *J Natl Cancer Inst*, 81(24): 1879-86.
- House JS, Landis KR, Umberson D (1988) Social relationships and health. *Science*, 241: 540-545.
- Kosykh NE, Savin SZ (2009) Risk factors for breast cancer (population aspect). Khabarovsk: publishing house of the Far Eastern State Medical University.

- Lehto US (2005) Predictors of quality of life in newly diagnosed melanoma and breast cancer patients *Annals of Oncology*, 16(5): 805 – 816.
- Nickson C, Procopio P, Velentzis LS, Carr S, Devereux L, Mann GB, James P, Lee G, Wellard C & Campbell I (2018) Prospective validation of the NCI Breast Cancer Risk Assessment Tool (Gail Model) on 40,000 Australian women. *Breast cancer research: BCR*, 20(1): 155-169.
- Parkin DM, Bray F, Ferlay J, Pisani PC (2005) *Global Cancer Statistics 2002 // A Cancer Journal for Clinicians*, 55(2): 74-108.
- Roseland M.E, Schwartz K, Ruterbusch JJ, Lamerato L, Krajenta R, Booza J & Simon MS (2017) Influence of clinical, societal, and treatment variables on racial differences in ER-/PR- breast cancer survival. *Breast cancer research and treatment*, 165(1): 163–168.
- Shariff-Marco S, Yang J, John EM (2015) Intersection of Race, Ethnicity and Socioeconomic Status in Mortality After Breast Cancer. *J Community Health*, 40: 1287–1299
- Sharova ON (2017) Resistance to stress as an indicator of medical, psychological, and social adaptation of persons having oncological conditions. *Living psychology (Russian journal of humanistic psychology)*, 4(2): 157–174.
- Shumel AK, Tishchenko EM (2016) Occurrence of breast cancer risk factors in women who received inpatient treatment. *Journal of Grodno State Medical University*, 2(54): 70-74.
- Vona-Davis L & Rose DP (2009) The influence of socioeconomic disparities on breast cancer tumor biology and prognosis: a review. *Journal of women's health (2002)*, 18(6): 883–893.
- Zhang L, Jie Z, Xu S, Zhang L, Guo X (2018) Use of Receiver Operating Characteristic (ROC) Curve Analysis for Tyrer-Cuzick and Gail in Breast Cancer Screening in Jiangxi Province, China. *Medical science monitor: international medical journal of experimental and clinical research*, 24: 5528–5532.