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REVIEW

PREVENTIVE MEASURES AGAINST DEVELOPMENT OF BREAST CANCER

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ABSTRACT

According to Russian statistics, breast cancer ranks first among malignant neoplasms among women (20.9%). The largest proportion of breast cancer cases is detected in women aged 35 to 55 years. Therefore, an urgent issue is not only the provision of specialized medical care to patients, but also the prevention of the development of the disease. Almost 70% of malignant neoplasms, including breast cancer, are provoked by exogenous factors. This article provides an overview of the literature on primary breast cancer prevention. It is established that a woman's lifestyle, diet, physical activity, and bad habits can have a potentiating effect on the development of breast cancer.

Conclusions. Currently, breast cancer prevention plays a key role in the fight against this disease. middle-aged women (who account for the main peak of morbidity) should understand that by changing behavior, it is possible to reduce the risk of developing breast cancer. In addition, increasing women's awareness of breast cancer and its prevention can help reduce the incidence and financial costs of treatment.

Keywords:
breast cancer, prevention, morbidity, body mass index, alcohol consumption, nutrition.

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ОБЗОР

ПРОФИЛАКТИКА РАЗВИТИЯ РАКА МОЛОЧНОЙ ЖЕЛЕЗЫ

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РЕЗЮМЕ

По данным российской статистики рак молочной железы занимает первое место среди злокачественных новообразований среди женщин (20,9%). Наибольшая доля случаев рака молочной железы выявляется у женщин в возрасте от 35 до 55 лет. Поэтому актуальным вопросом становится не только оказание специализированной медицинской помощи пациентам, но и профилактика развития этого заболевания. Почти 70% злокачественных новообразований, в том числе и рак молочной железы, провоцируются экзогенными факторами. В этой статье представлен обзор литературы о первичной профилактике рака молочной железы. Установлено, что образ жизни женщины, питание, ее физическая активность, вредные привычки могут оказывать потенцирующее влияние на развитие рака молочной железы.

Заключение. В настоящее время профилактика рака молочной железы играет ключевую роль в борьбе с этим заболеванием. Женщины среднего возраста (на который приходится основной пик заболеваемости) должны понимать, что путем изменения поведения возможно снизить риск развития этого заболевания. Кроме того, повышение осведомленности женщин о раке молочной железы и его профилактике может способствовать снижению заболеваемости и финансовых затрат на лечение.

Ключевые слова:
рак молочной железы, профилактика, заболеваемость, индекс массы тела, употребление алкоголя, питание.

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INTRODUCTION

Breast cancer (BC) is the most common cancer among women [1–4]. All over the world, BC cases account 22.9% [5]. BC ranks first in Russia and is the leading oncological pathology among women [6]. The proportion of BC is 20.9% in the structure of malignant neoplasms in women [7].

In the United States, more than 20% of BC cases are diagnosed in women under the age of 50, and only more than 4% are diagnosed in women under the age of 40 [8]. The specific weight of BC depending on the age of patients in Russia is shown in the figure 1 [7]. According to Russian statistics, the largest proportion of BC cases is detected in women aged 35 to 55 years [7]. Therefore, prevention of BC should begin in advance for women of 25–30 years. An important target of prevention is triple negative BC, which occurs in 10% to 20% of all breast malignancies [9]. It is known that triple negative BC is difficult to treat [10].

Almost 70% of malignant neoplasms are provoked by exogenous factors. In case of BC, these indicators reach 90–95% [11]. Currently, there are many studies indicating the influence of lifestyle (high-fatty diet, alcohol consumption, lack of physical activity) and environmental factors on the development of BC, the elimination of which can contribute to reducing morbidity and mortality [11].

Regular physical activity and maintaining a normal body weight are key areas in the prevention of BC [12]. According to Chinese researchers, daily exercise reduces the risk of developing BC in women in the premenopausal and postmenopausal periods, and the elimination of inactivity can prevent about 10% of cases of BC [13]. Active sports activities help to reduce the risk of developing BC. Even moderate physical activity, such as brisk walking, is beneficial. According to the study carried by the American Cancer Society, women who walked at least 7 hours a week had a 14% lower incidence of postmenopausal BC than women who walked less than 3 hours a week [14]. In women with high physical activity, the risk of BC decreased by 25% compared to the least active respondents [14]. In another study, it was recorded that if a postmenopausal woman takes daily walks for one hour, the risk of BC is reduced by 15% compared to women who lead a sedentary lifestyle [15]. It is interesting to note that the risk of developing BC in a middle-aged woman is significantly reduced if she is engaged in sports throughout her life [16].

A low-activity lifestyle often correlates with

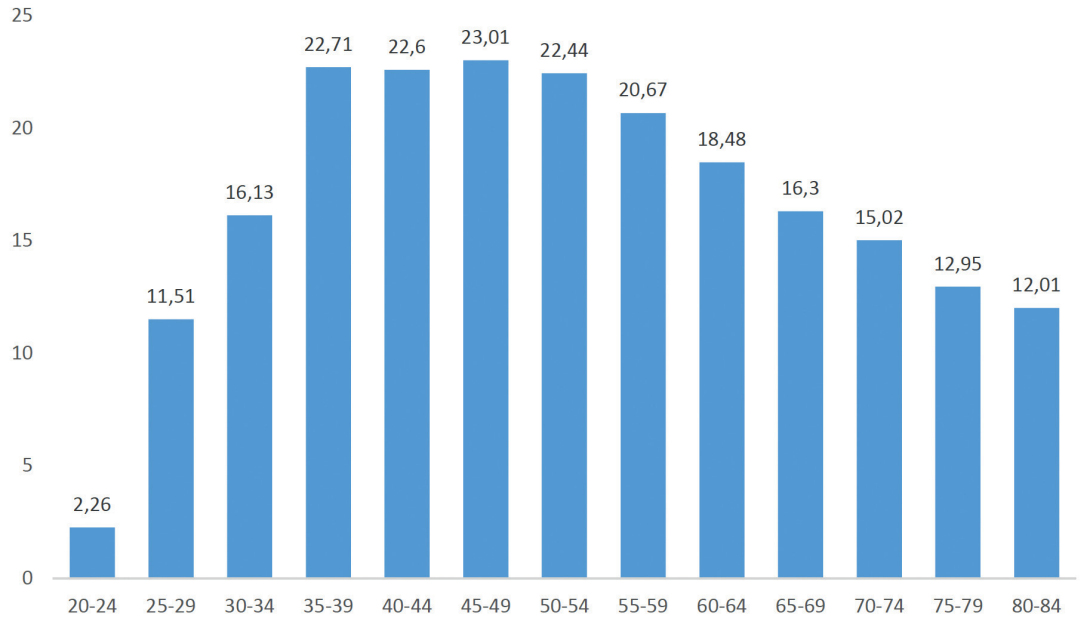

Fig. 1. Specific weight (%) of BC depending on the age of patients [7].

being overweight. Thus, according to US statistics, more than two-thirds of the adult population are overweight body mass index (BMI) – 25.0–29.9 kg/m^2, or obese (BMI, ≥30.0 kg/m^2) [17]. In the study "Health of Nurses", it was recorded that increased body weight in 18-year-old girls significantly increases the risk of developing BC in the future, and is directly related to the number of pounds added [15]. Scientists pay special attention to weight correction in menopausal women. Since the metabolism of androgens into estrogens in adipose tissue increases the level of circulating estrogens, and their excess increases the risk of developing BC [18]. In a 2008 meta-analysis, it was noted that an increase in BMI for every 5 kg/m^2 increases the risk of developing postmenopausal BC by 12% [19]. Among postmenopausal women who monitored their weight, or reduced it by 10 kg or more, the risk of developing BC is reduced by half compared to women who had a stable high weight. Thus, the correction of body weight in a woman in adulthood is one of the important areas of primary prevention of BC.

Alcohol consumption is a risk factor for BC in women [8]. It is known that ethanol affects the concentration of estrogen by several mechanisms [20]:

– increases the activity of aromatase,

– inhibits the enzymes involved in the degradation of estrogen,

– increases the oxidative stress of the liver, which leads to inhibition of the metabolism of steroids,

– reduces the secretion of melatonin, which suppresses the production of estrogen

As a result, estrogens can have a carcinogenic effect on breast tissue.

It is noted that the consumption of alcohol 10 g per day (in terms of alcohol) leads to an increase in the risk of developing BC by 7–10% [21]. Women who consume alcoholic beverages on average three to six times a week have a 15% higher chance of developing BC, compared to those who lead a sober lifestyle [18]. Female alcoholics who consume alcoholic beverages twice a day or more have a 51% higher risk of developing BC [8].

The risk of developing BC is affected not only by the amount of alcohol consumed, but also by the age of the woman. Alcohol consumption in adolescence has been shown to significantly increase the risk of proliferative benign breast changes in middle-aged women [20]. Alcohol consumption at a young age provokes the development of invasive BC in women in the premenopausal period [8].

The risk of developing BC is higher in women who consume industrial soft drinks more than once a month [22]. Industrial soft drinks are high in calories and lead to an increase in BMI, obesity and insulin resistance, which are mediators of the risk of BC.

Many authors note that improper and unbalanced nutrition potentiate the risk of developing BC [23]. Red and processed meats, foods rich in carbohydrates, and saturated fats are considered potential risk factors for BC, as they increase the level of circulating endogenous estrogen, an insulin-like growth factor – 1 [24]. In a comprehensive meta-analysis involving 17 prospective studies, the association of red and processed meat consumption with the risk of BC was evaluated [25]. It has been shown that the consumption of red meat is associated with an increase in the risk of BC by 6%, and the use of processed meat leads to an increase in the risk of BC by 9% [25]. Sodium nitrate in processed meats such as sausage, hamburgers, and pizza is known to convert to nitrosamine, which is a known carcinogen. Researchers from Poland reported that the probability of BC increases by 3 times with daily consumption of fast food [26]. Also, the processes of carcinogenesis are affected by high temperature processing of meat. Thus, cooking red meat at high temperature increases the formation of carcinogenic substances, including heterocyclic amines, N-nitroso compounds, and polyaromatic hydrocarbons [5]. Regular consumption of fried food increases the risk of developing BC by 4.5 times (95% confidence interval, 2.1–9.4) [27].

Consumption of milk and dairy products containing saturated fat, calcium, vitamin D, butyrate, lactoferrin, and conjugated linoleic acid reduces the risk of developing BC [5]. A meta-analysis of 18 prospective cohort studies (*n*=24,187) showed that increased consumption of dairy products leads to a reduced risk of BC (OR 0.85; 95% confidence interval: 0.76–0.95; *P*=0.01) [28]. These data were con-

firmed by Zang J. et al. the largest meta-analysis included 22 prospective cohort studies (1,566,940 participants) and five case-control studies (33,372 participants) [29]. The authors found a significant relationship between the dose, duration of use and type of dairy products and the development of BC: high (>600 g/day) and moderate (400–600 g/day) consumption of dairy products more effectively reduces the risk of BC compared to low consumption of dairy products (<400 g/day) [29].

The consumption of plant foods, fruits and vegetables contributes to the reduction of oxidative stress [30] and the prevention of carcinogenesis. An Italian study by the European Prospective Investigation of Cancer and Nutrition (EPIC) showed a direct link between high consumption of leafy and fruit vegetables, as well as raw tomatoes, and a low risk of developing BC [31]. The use of carotenoid-containing foods in the diet also reduces the proliferative processes in the mammary gland [15]. High consumption of plant protein and fiber is inversely proportional to the risk of developing breast neoplasms [32]. Regular consumption of vegetables and fruits (up to 2–3 times a day) reduces the likelihood of developing BC (OR, 2.8; 95% CI, 1.7–4.5) [27].

The consumption of seafood with a high content of eicosapentaenoic (EPA) and docosahexaenoic (DHA) acids (Omega-3 PUFA) reduces the frequency of BC by more than 5% [5]. Omega-3 PUFAs inhibit the antioxidant activity of cancer cells and can bind to nuclear receptors in tumor cells, modulating the expression of target genes involved in lipid metabolism and cell apoptosis [33].

A significant relationship was found between the consumption of sugary foods and the risk of developing BC [27]. Thus, the relative risk of developing BC in women who regularly consumed sweets for more than a month was 2.6 (95% CI; 1.7–3.9) [27].

Some exogenous factors may influence the development of a certain type of BC. For example, breastfeeding prevents the development of triple negative BC [34]. In a prospective study, breastfeeding for 4 months or longer was shown to reduce the risk of basal-like BC by 40% (relative risk 0.6; 95% confidence interval 0.4–0.9) [35]. The EPIC study, conducted on a large (*n*=337,327) heterogeneous cohort of women, showed a positive correlation between high consumption of fatty foods with a high content of saturated fat and the development of an estrogen-positive subtype of BC [31].

Thus, according to experts, more than half of all cases of BC can be prevented by promoting and implementing a healthy lifestyle [8]. It is clear that risk factors for BC, such as obesity and lack of physical activity, will never be completely eliminated. But, early prevention of these diseases can prevent thousands of new annual cases of BC [8, 36].

CONCLUSIONS

Prevention of BC currently plays a key role in the fight against this disease. The main strategy of primary prevention of BC is to position a healthy lifestyle of a woman: regular physical activity, proper nutrition, weight correction and moderate alcohol consumption. Middle-aged women (who account for the main peak of the incidence) should understand that by changing behavior, it is possible to reduce the risk of developing BC. In addition, increasing women's awareness of BC and its prevention can help reduce the incidence and financial costs of treatment.

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Akobova R.A. – design of the references list, translation of the abstract into English.

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