



(REVIEW ARTICLE)



## A review of the literature on breast cancer prevention, treatment, and recurrence

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GSC Advanced Research and Reviews, 2023, 15(03), 222–226

Publication history: Received on 05 May 2023; revised on 17 June 2023; accepted on 20 June 2023

Article DOI: <https://doi.org/10.30574/gscarr.2023.15.3.0245>

### Abstract

Diets and their implications for cancer prognosis are topics of considerable study. According to a World Cancer Research Fund analysis in 2014, food did not significantly affect the prognosis for breast cancer in women with a history of the disease. This literature review's objective was to refresh our understanding of the subject. According to this review, diet affects the prognosis of breast cancer. However, the level of evidence needed to be increased to support the recommendations. In the end, encouraging a balanced and healthy diet may help lower global mortality.

**Keywords:** Breast Cancer; Lifestyle; Prevention; Recurrence; Treatment

### 1. Introduction

With more than 2 million new cases identified in 2018, breast cancer (BC) is the second most frequent cancer globally and the most common malignancy in women (22.9% of female cancers). Due to longer life expectancies, urbanization, and adopting Western lifestyles, the incidence is increasing in emerging countries, even though it is higher in Western Europe and North America. The five-year survival rate has increased from 63% in 1960 to 90% in the present, according to the American Cancer Society, thanks to earlier diagnosis from mammography screening and better surgery and adjuvant therapy. The death rate in BC has significantly slowed to 6.6% in 2018. Even 20 years after the initial diagnosis, survivors face a higher risk of recurrence. They also have a higher risk of gaining weight and developing other concomitant conditions, such as metabolic or cardiovascular diseases is a diverse disease from a clinical perspective [1]. The most common malignancy in women is breast cancer. North America and Western Europe had a more significant annual, standardized incidence (91 cases per 100,000 people) than Southeast Asia (27 instances per 100,000 women). Mainly, breast cancer cases found after menopause are less common in Asia than in the West. Authors have noted a rise in breast cancer cases among Japanese women who immigrated to the US in the 1990s, highlighting the likely contribution of the Western way of life. Some Asian nations have recently embraced a more Western way of life, which is correlated with a recent rise in the incidence of breast cancer. The authors claim that the studies' degree of proof needed to be revised to make recommendations. However, a correlation exists between weight, exercise, a diet high in fiber and soy and low in fat, and post-breast cancer survival [2]. The goal of this study is to give a summary of the most recent research on the connection between BC and dietary variables.

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## 2. Methodology

The Rapid Review Guidebook, including subsequent steps, endorses Dr. Dobbin's evidence-informed decision-making (EIDM) procedure. The methodology used was called "Steps for Conducting a Rapid Review." Using the Health Evidence™ tool, we found and accessed pertinent research evidence, assessed its methodological quality, and synthesized it.

### 2.1. Search Strategies

These key search terms were developed after quickly going over the research questions: "Nutrition," "breast cancer," and "Treatment."

### 2.2. The final search string is as below:

Breast cancer, "Nutrition," and "Treatment." "Four databases—Scopus, Google Scholar, PubMed, and the Cochrane Library—are used to conduct thorough searches for publications. Google Scholar has been added to help raise awareness of the grey literature due to the volume of publications in the work environment and job happiness disciplines. Scopus, PubMed, and the Cochrane Library expertly provided peer-reviewed publication coverage.

### 2.3. Eligibility criteria

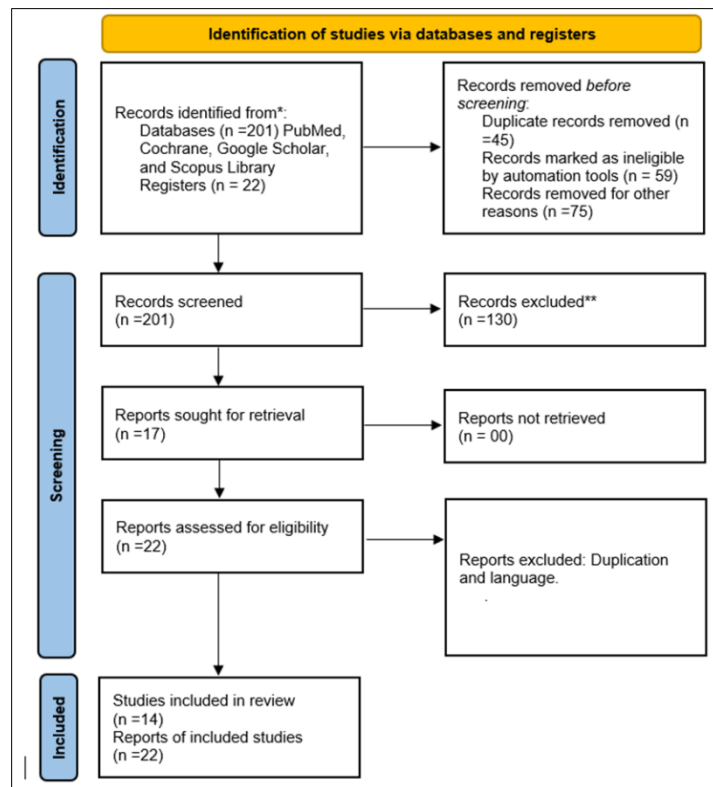
The literature search includes all articles, theses, and review papers published before May 2023 that dealt with nutrition and breast cancer.

### 2.4. Data Extraction

Two impartial medical experts reviewed the articles to assure the selection's objectivity. The two reviewers agreed on the final selection of articles for additional data extraction in 80% of the cases.

### 2.5. Results of the literature search

This review adhered to the Preferred Reporting Items for Reviews (PRISMA).



**Figure 1** Preferred Reporting Items for Reviews (Health Evidence™ tool) [3] (PRISMA) flow diagram of the literature screening process

A total of 201 articles were whittled down to items that might be pertinent during the initial screening step. Because their names, abstracts, and book chapters were written in languages other than English, relevant articles had to be omitted. The Health Evidence™ tool's Preferred Reporting Items for Reviews (Figure 1) revealed 22 based on the inclusion criteria.

### 3. Result and Discussion

Following a healthy lifestyle, which includes managing weight and eating a high-quality diet, affects the chance of having BC and the results after diagnosis. Obesity is mainly caused by a sedentary lifestyle and poor eating habits, characterized by an excessive intake of high-calorie meals (rich in sugar and saturated fats) and a low intake of nutritious foods (including omega-3 fatty acids, natural antioxidants, and fiber). Such a situation increases adipose tissue inflammation, promoting BC's growth and progression by fostering an advantageous microenvironment. Obesity is linked to a higher risk of post-menopausal BC, BC recurrence, and BC mortality. Body mass index (BMI) and BC survival were correlated by systematic literature review and meta-analysis of 22 follow-up studies, which included 213,075 BC survivors and 41,477 deaths (of which 23,182 were BC-related). For each 5 kg/m<sup>2</sup> increase in BMI, mortality risks have increased by 17%, 11%, and 8% overall and by 18%, 14%, and 29% for BC-specific mortality, respectively

- Before BC diagnosis
- Within 12 months of diagnosis, and
- Within 12 months or more of diagnosis. In addition to BMI, some studies found a substantial relationship between BC mortality in postmenopausal women and the waist-hip ratio.

The risk of BC development and post-diagnosis results are influenced by maintaining a healthy lifestyle regarding high-quality food consumption. Epidemiological and preclinical evidence points to some foods and nutrients (such as saturated fats, red meat, and processed meat) encouraging BC development by raising the levels of endogenous estrogens, insulin-like growth factors, and pro-inflammatory cytokines in the blood. Against the beginning or progression of BC, however, polyunsaturated fatty acids, vitamins C and E, fresh fruits, and vegetables offer preventive effects. According to numerous studies, the Mediterranean diet and BC have the opposite relationship. However, there is not enough evidence to support the relationship between food and BC incidence and death. Natural antioxidants are known to be present in fresh fruits and vegetables. Their regular ingestion raises the body's fiber level and polyphenols, which resist tumorigenesis. Polyphenols can alter BC's proliferation and metastatic activity by controlling cellular signaling pathways and obstructing the enzymatic activity of tumor-supportive proteins, including the transcriptional factor NF- $\kappa$ B. Polyphenols can also interfere with the estrogen-signaling pathway by preventing the formation of estrogen and aromatase or by obstructing the estrogen receptors (ERs). By binding estrogens and lowering their serum levels or by enhancing insulin sensitivity and preventing weight gain, fibers have been found to prevent carcinogenesis like this. The impact of dietary fat consumption is influenced by menopausal status. In contrast to pre-menopausal women, dietary lipids appear to have a protective effect on BC risk in postmenopausal women. According to a recent study, eating much saturated fat increases your risk of developing BC and, most obviously, receptor-positive cancer, especially ER+. Dietary lipids may affect intracellular signaling cascades, which may impact the process of carcinogenesis, according to research on cancer. The data is sparse, even though a high-fat diet, high total cholesterol, and high triglyceride levels are generally linked to an elevated risk. Since 1980, physical exercise has been promoted as a preventative measure against BC, and during the past 20 years, numerous studies have examined the link between physical activity and BC [4,5]. Numerous studies have shown the link between regular physical activity and improved health outcomes, which further lowers the risk of lifestyle-based cancer risk factors. The results showed that physical activity increases survivors' life expectancy and reduces the likelihood of recurrence. Multiple interconnected physiological processes, such as sex hormones, insulin resistance and insulin levels, inflammation, oxidative stress, and adipokines, are thought to reduce the risk of tumorigenesis, even though there is no direct connection between physical activity and cancer risk reduction. Finding the mechanisms through which physical activity decreases BC risk establishes biological plausibility for the observed association and offers proof of the best exercise regimen for lowering cancer risk [6]. Additionally, knowing how exercise and BC are related may offer new perspectives on cancer biology, which helps develop additional cancer prevention and treatment methods. To develop public health recommendations about the relationship between physical activity and BC risk, a more thorough assessment of the nature of the association by exercise type, dose, and time is required [7].

The crucial role exercise plays in BC prevention and recurrence has been well investigated by researchers. Higher levels of physical activity with a dose-response relationship decreased the incidence of postmenopausal BC, according to the World Cancer Research Fund/American Institute for Cancer Research findings. The American Cancer Society's Physical Activity Guidelines for Americans, released in 2020, further emphasized the need for an active lifestyle to prevent and treat BC [8]. The effects of physical activity on cancer risk include metabolic (calorie balance), hormonal, and

immunological reactions. In order to assess the relationship between self-reported physical activity assessments and the incidence of 26 different malignancies, Moore et al. used data from prospective US and European cohorts. They concluded that physical activity levels are associated with a lower risk of 13 cancers, including BC. Further research is required to fully understand the importance of critical levels of physical activity and their inverse correlations in patients with ER-negative BC. Many healthcare practitioners use technology-based interventions to increase daily physical activity levels in women to address the difficulties of women's lifestyle interventions and motivate them to become more physically active to reduce their risk of BC [9,10].

Regardless of menopausal status, physical activity helps survivors beat the disease and significantly delays the start of BC. For pre-menopausal women, exercise has a more significant positive effect. A large-scale dose-response relationship investigation showed similar findings. The findings verified the correlation between physical exercise, improved survival rates, and a decreased chance of BC recurrence. Furthermore, exercise is especially beneficial for females with ER-positive tumors. Clinical oncologists, however, can provide a specific workout plan and prescription for women. The treatment phase (three times per week for the duration of chemotherapy and radiation, if received), the post-treatment phase (two times per week for the subsequent 10 weeks), and the maintenance phase are the three unique research phases with varying exercise recommendations [11]. Similarly, a recent study found that compared to an unsupervised physical exercise program based on individual preferences with patient therapeutic education, a supervised therapeutic exercise program plus patient therapeutic education can significantly reduce perceived fatigue and increase functional capacity in BC survivors suffering from cancer-related fatigue. These data imply that physical activity is a straightforward, affordable method of reducing BC risk that may impact the prognosis for millions of BC-affected women. The three main subtypes of BC are (i) estrogen and progesterone receptor-negative BC (HR-), (ii) human epidermal growth factor 2 (ERBB2) receptor BC, and (iii) both hormonal and growth factor negative (TNBC) based on the presence or absence of molecular markers on the plasma membrane of breast cells. 90% of BC cases are not metastatic when they are diagnosed. It is advised that all non-metastatic BC patients get local therapy, which entails surgical resection, and that they weigh postoperative radiation if lumpectomy is chosen [12].

Prior to surgery, patients are encouraged to start systemic therapy. The ultimate objective of treating each subtype of metastatic BC is to extend life and relieve symptoms. The three BC subtypes are treated using different risk profile approaches [13,14].

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#### 4. Conclusion

According to this review, diet affects the prognosis of breast cancer. However, the level of evidence was insufficient to support recommendations. In the end, encouraging a balanced and healthy diet may help lower global mortality.

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#### Compliance with ethical standards

##### *Acknowledgments*

I was appreciative of my mentor's suggestions and assistance as I was writing this post.

##### *Disclosure of conflict of interest*

There are no conflicts of interest, according to the authors.

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