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Research on Early Screening and Treatment of Breast Cancer

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Abstract: Breast cancer has become a major issue in global health, with its occurrence consistently increasing over time. This trend is not limited to specific regions or countries; Even in China, breast cancer rates have been increasing annually. As a result, there is an urgent need to focus on early screening and prevention strategies for this disease. Hence, the objective of this study is to delve into the realm of early screening and prevention of breast cancer. By employing the literature research method and case study approach, individuals can gain valuable insights into effective measures that can be taken to detect breast cancer at its earliest stages and prevent its progression. One of the primary research questions revolves around exploring various methods for early screening and treatment of breast cancer. Through extensive analysis of existing literature, the author aims to identify key indicators or biomarkers that can aid in the timely detection of this malignancy. Additionally, understanding different treatment modalities will enable us to provide better medical services and support for individuals diagnosed with breast cancer. Ultimately, the research endeavors seek to enhance healthcare outcomes by strengthening early screening efforts. The author aims to reduce the incidence of complications related to advanced-stage diagnoses by enhancing the early detection rate of breast cancer. Furthermore, comprehensive utilization of diverse treatment methods will ensure that patients receive personalized care tailored specifically towards their unique circumstances.

Keywords: Breast cancer, early screening, treatment, rehabilitation

1. Introduction

Breast cancer is a pressing issue in the field of global health, impacting countless women across the globe [1]. The high incidence of this disease poses a severe threat to women's health and well-being. It is crucial to address this issue by focusing on early screening and timely treatment. Early detection plays a crucial role in enhancing the prognosis of individuals diagnosed with breast cancer. By detecting the disease at an early stage, healthcare professionals can initiate appropriate treatment interventions promptly, leading to better outcomes for patients. Various methods are available for early screening, including mammography, clinical breast examination, and genetic testing. The study aims to explore the effectiveness of early screening methods for breast cancer and identify strategies to optimize their use. The significance of this research lies in enhancing public awareness of breast cancer. By increasing knowledge about risk factors, symptoms, and the importance of regular screenings among both women and men, this paper is expected to empower individuals to take

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proactive steps towards prevention and early detection. Additionally, promoting the popularization of early screening will help reduce morality rates associated with late-stage diagnoses. Furthermore, this study seeks to provide valuable references for clinical treatment approaches in breast cancer cases. Through analyzing data from various screening methods and evaluating their efficacy in identifying tumors or abnormalities accurately, healthcare providers can make informed decisions regarding patient management plans, thus improving the quality of life of patients. In general, the primary objective of these research endeavors is to make substantial advancements in the domain of breast cancer detection and therapy, ultimately providing advantages for individuals impacted by this ailment.

2. Overview of Breast Cancer

2.1. Definition and Pathological Types

Breast cancer is a type of cancerous tumor that develops in the glandular epithelial tissue found within the breast. Usually due to genetic mutations in breast cells, abnormal cell proliferation and loss of normal cellular regulatory mechanisms lead to the formation of tumors [2].

The different types of breast cancer can be classified into two main groups: non-invasive cancer and invasive cancer. Non-invasive cancer refers to cases where tumor cells remain confined within the ducts or lobular area of the breast without breaking through the surrounding membranes. This type of cancer generally has a favorable prognosis and a relatively low risk of progressing to invasive stages. Examples include intraductal carcinoma, which is characterized by tumor cells staying within the breast ducts, and lobular carcinoma in situ, which occurs specifically in the lobular region without invading neighboring tissues. It also takes time and conditions for this type to develop into invasive cancer.

The most common form of breast cancer is invasive ductal carcinoma, which falls under the category of invasive carcinoma. Cancer cells break through the basement membrane of the ductal tube and infiltrate the surrounding tissue. The tumors are varied in form and can be manifested as masses, nodules and so on. Invasive lobular carcinoma involves a single line of cancer cells that infiltrates the fibrous interstitium outside the lobule of the breast. Its growth pattern is relatively special, and sometimes easy to be confused with other breast lesions. Special types of invasive carcinoma include medullary carcinoma, mucous carcinoma, tubular carcinoma, etc. These types are relatively rare, but each has unique pathological features and clinical manifestations. For example, medullary cancers are usually more clearly defined and have a softer texture; Myxocarcinoma contains a lot of mucus, and the tumor is soft and elastic [2].

2.2. Risk Factors

As women age, the incidence of breast cancer adjusted for age tends to increase. The majority of breast cancers are diagnosed in women. Having a previous history of cancer in one breast raises the likelihood of developing cancer in the other breast. Histological abnormalities identified through a biopsy, such as lobular carcinoma in situ, serve as risk factors. Individuals with first-degree relatives who have had cancer face an elevated risk due to family history, and susceptibility genes like BRCA1 and BRCA2 play significant roles. Reproductive factors like early onset of menstruation, delayed first childbirth, and nulliparity contribute to increased risk levels. Exogenous hormone usage encompasses contraception methods and hormone replacement therapy. Radiation exposure, environmental factors, obesity, and excessive alcohol consumption also correlate with heightened chances of developing breast cancer [3].

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3. Early Screening for Breast Cancer

3.1. Common early Screening Methods

3.1.1. Self-examination

About a week after the end of menstruation every month (postmenopausal women fixed one day a month), under bright light in front of the mirror to observe the size, shape, skin condition of the breast; Gently touch the breast and underarm with your fingers to check for lumps, induration, and enlarged lymph nodes.

3.1.2. Clinical Physical Examination

The doctor palpates and inquires about family medical history, menstrual history, fertility history, and other factors to assess the risk.

Breast ultrasound: non radiative, high resolution, suitable for young women and dense breast, can screen and diagnose.

Mammography (molybdenum target): sensitive to microcalcifications, suitable for screening women over 40 years old [4].

Magnetic Resonance Imaging (MRI): With extremely high resolution, it is valuable for screening high-risk populations, but the cost is high [4].

3.2. Technological Progress in early Screening

Magnetic resonance imaging (MRI) is a screening method that utilizes magnets, radio waves, and computers to generate detailed images of the internal areas within the body. This technique, also known as nuclear magnetic resonance imaging (NMRI), does not involve X-rays or radiation exposure for women at high risk of breast cancer. Unlike mammography, MRI has a higher likelihood of detecting benign breast lumps. Mammography, which involves taking X-ray images of the breasts, is commonly used for breast cancer screening. It can detect small tumors that may not be palpable and identify ductal carcinoma in situ (DCIS), where abnormal cells are present in the mammary ducts and could potentially progress into invasive cancer. Digital breast tomosynthesis (DBT) was approved by the US Food and Drug Administration (FDA) in 2018 and is now implemented in three out of four medical facilities. A recent study revealed that combining two-dimensional mammography (S2D) with DBT enhances tumor detection rates while reducing regression, radiation dosage, and overall cost associated with mammography.

In the event that breast cancer screening is not available, regular BSE can serve as a means to prompt women to engage in opportunistic screening, consequently enhancing rates of early detection. Especially in some areas where medical resources are relatively scarce, CBE can be used as a low-cost and easy screening method [5].

4. Breast Cancer Prevention

Cancer is not an individual ailment, but rather a collection of interconnected diseases. Our genetic makeup, lifestyle choices, and surrounding environment collaborate to either elevate or diminish our susceptibility to cancer development. Each person's risk of developing cancer is influenced by a combination of these factors [6]. While some risk factors for cancer can be avoided, many others cannot be evaded. For instance, smoking and inheriting specific genes are associated with increased risks of certain types of cancer in particular individuals; however, only smoking can be actively avoided. Engaging in regular physical activity and maintaining a healthy diet may act as protective

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measures against certain forms of cancer. Although reducing risk factors and enhancing protective factors may lower your chances of developing cancer, it does not guarantee complete prevention.

4.1. Lifestyle and Prevention

Increase the consumption of fiber-rich foods like vegetables, fruits, whole grains, and legumes. These food items are abundant in essential nutrients, vitamins, minerals, and antioxidants that aid in maintaining a healthy metabolism and bolstering the immune system's functionality within the body. Decrease the intake of high-fat, high-calorie, and high-sugar foods. Excessive consumption of saturated fat and trans fat can elevate estrogen levels in the body thereby amplifying the susceptibility to breast cancer. Simultaneously, consuming calorie-dense and sugar-laden foods can contribute to weight gain; obesity being one of the risk factors associated with breast cancer as well.

Engage in a minimum of 150 minutes per week in moderate intensity aerobic activities, such as brisk walking, jogging, or swimming. Aerobic exercises have the potential to enhance cardiovascular function, boost metabolic capacity, and contribute to maintaining a healthy weight.

Maintain a body mass index (BMI) within the range of 18.5-23.9 to ensure a healthy physique. Obesity can lead to elevated estrogen levels in the body, thereby increasing the susceptibility to breast cancer. By adopting a sensible diet and engaging in moderate exercise routines, it is possible to manage weight effectively and reduce the risk of breast cancer.

Smoking poses significant risks not only for breast cancer but also for other types of cancers and cardiovascular diseases. Quitting smoking can substantially decrease the likelihood of developing breast cancer while simultaneously improving overall health conditions.

4.2. Genetic Factors and Prevention

Women who possess BRCA1 and BRCA2 genes or other gene alterations are at an increased susceptibility to developing breast cancer. The likelihood of genetic-induced breast cancer is contingent upon the specific type of gene mutation, familial history of cancer, and additional factors. Pre-menopausal women with an elevated risk for breast cancer due to certain modifications in the BRCA1 and BRCA2 genes have the option to undergo preventive oophorectomy (the removal of both ovaries in the absence of any signs of cancer). This procedure diminishes estrogen production within the body, thereby reducing the chances of developing breast cancer.

5. Breast Cancer Treatment

Surgical interventions for breast cancer encompass total mastectomy and partial mastectomy, with the latter often necessitating radiation therapy; Additionally, there is a possibility of performing axillary lymph node dissection [7-9].

Radiation therapy: Postoperative radiation therapy can reduce the risk of local recurrence after breast conserving surgery or specific total mastectomy; Palliative radiotherapy can alleviate the symptoms caused by metastasis of advanced breast cancer.

Chemotherapy is administered as an adjuvant treatment following surgery to minimize the chances of cancer recurrence; Neoadjuvant chemotherapy before surgery can enhance the success rate of surgical removal.

Endocrine therapy: suitable for hormone receptor positive patients, commonly using tamoxifen, aromatase inhibitors, etc., with a long treatment time.

Targeted therapy: HER2 positive patients can use trastuzumab, etc., which can be used in combination with other treatments.

Anything that reduces the likelihood of contracting a disease is referred to as a protective factor. Protective factors for breast cancer encompass the following: Utilizing any of the subsequent options:

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Selective estrogen receptor modulators (SERMs), Aromatase inhibitors, Decreased exposure of breast tissue to endogenously produced estrogen. This can be achieved through: Early pregnancy, Breastfeeding, Engaging in sufficient physical activity. Undergoing any of the ensuing procedures: Mastectomy for risk reduction purposes, ophorectomy for risk reduction purposes, Ovarian ablation.

6. Conclusion

Breast cancer is a disease that affects a large number of women globally and poses a significant risk to their overall well-being. It involves the growth of cancerous tumors in the breast tissue, leading to detrimental impacts on both physical and mental health. One of the major concerns associated with breast cancer treatment is its potential to induce premature aging in patients. The aggressive nature of treatments such as chemotherapy, radiation therapy, and hormonal therapies can lead to various side effects that contribute to accelerated aging processes. These may include skin changes, hair loss, fatigue, cognitive impairment, and decreased bone density. In addition to these physical challenges, breast cancer patients also faces numerous psychological challenges throughout their journey. This article covers the early screening of breast cancer and its treatment and prevention, from surgical treatment of breast cancer to small dietary structure in life.

In the future, scholars need to further strengthen research on the mechanisms of breast cancer premature aging and develop more effective treatment and prevention strategies. Multidisciplinary collaboration will also play a greater role in the management of premature breast cancer, integrating medical, psychological, nutritional and other resources to provide patients with a full range of care and support. It is believed that with the continuous progress of medical technology and the deepening of the understanding of premature breast cancer, we can better cope with this problem and bring more hope and happiness to breast cancer patients

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