

Breast cancer treatment: survival facts and associated side effects

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REVIEW ARTICLE

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ABSTRACT

In the world the cancer is a prevailing disease therefore some rational and effective therapy required. The breast cancer is one of the most common cancers in a woman and now a day's patients are increase. Therefore, development and research are ongoing on the effective treatment on breast cancer. The breast cancer treatment is depending on the cancer stage disease and risk, based on this therapeutic agent should be employed in the patients to protect the breast cancer disease. Such treatments are reducing the mortality and morbidity but constant monitoring of drug adverse effect. Moreover, it has been seen that the survival rates in breast cancer is rising that is good news for science but on the other side the side effects of the treatments bring new challenges. The early stage diagnosis of the breast cancer can survive the effective or healthy patient life because of long-term and various treatment can be employed on the cancer disease otherwise breast cancer is life threatening illness. Survivors of breast cancer have not only the side effects issues of the cancer therapy treatment but also, they have many other issues of previous treatments therefore it is challenging job for the researchers. Consequently, this review article is dealing with the breast cancer effective treatments and side effects of it. Moreover, it includes the other long-term medical issues after breast cancer diagnosis and treatment. This review will help to the researchers for better understanding of the long-term medical issues in the breast cancer.

Keywords: Breast cancer, Adjuvant therapy, Chemotherapy, Endocrine therapy, Breast cancer treatment side effects and long-term medical issues.

1. Introduction

The breast cancer rate is growing day by day and it will become the second most cause of mortality in women (1, 2). Amongst several types of cancer, breast cancer is the third most fatal cancer (3) in the United States and approximately 2.5 million peoples have breast cancers. This number will increase up to 4.2 million in 2020 (4). Also, breast cancer is the most common cancer in the Asia. Moreover, it has been in notice that the millions of the breast cancer were neither registered nor treated because of the lack of resources, poor registration system and lack of awareness during third-world countries (5). The symptoms of breast cancer which is closely associated with reaction to therapy, therapeutic evaluation and typical features of tissues (6), (7, 8). It has been observed that the breast cancer management and diagnosis improvement affect the mortality frequency and reduction on the mortality frequency depends on the various geographical locations

(9, 10). The advance treatment in the early detection stages of the breast cancer can cure the cancer metastasis and such treatment can improve quality of life. Currently various treatments are available for the breast cancer such as radiation treatment, chemotherapy, endocrine treatment and surgery (11). The development of Nano formulations such as liposomes (12) and nanoparticles (13), (14) of chemotherapeutic drugs are also trying to improve outcome of breast cancer therapy. After breast cancer treatment the monitoring of the patients is the key role because the adverse effect of the treatment or any reaction on the patients occurs but is it is depending on the cancer carcinoma. Institute of Medicine (IOM) collecting the data of the patients who has breast cancer to survivor in cancer and published comprehensive report in 2006. This milestone report is based on the regularly updated date and time of treatment summary, summary of diagnosis, healthy lifestyle recommendations, future follow up and plans (15). The another eloquently described special

series issue includes the brief summary of world-renowned experts advice and research data in meanwhile Institute of Medicine were published their research data (16). Also, it includes the treatment protocols, the

development of lymphedema, bone health, the increased risk of second primary malignancies, long-term cardiovascular issues and other issues may not be life-threatening (16).

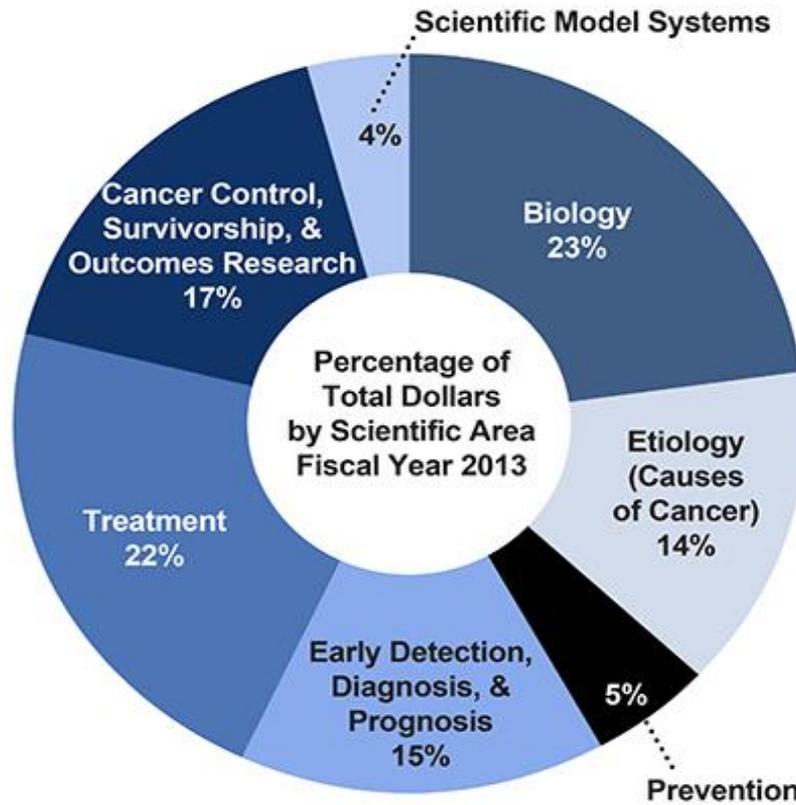


Figure 1. National cancer Institute Breast cancer Research Portfolio (17).

This issue focused on other multiple area such as the failure of adherence, risk of venous, hormonal therapies compliance and lifestyle changes. Non-specific symptoms such as insomnia, cognition fatigue etc. was not included because these symptoms are not specific and unique for the breast cancer (18). National cancer institute in the US funding in various essential sectors of breast cancer here in the figure 1 showing the 2013 fiscal year data. Survivorship care programs are playing significant role in the patient treatment pathway but somehow it fails in the communication and elaboration to patient regarding their long-term survival problems. For long term survival of the patients after treatment as per IOM 2006 data, continuous supervision and patient education to understand the problems play key role. In this article they have included and discussed the lymphedema, bone health, cardiovascular diseases, thromboembolic and second primary malignancy. The breast cancer people are not

died only because of the cancer disease but the other factors like diabetes mellitus, obesity, hyperlipidemia and hypertension are also affects the overall survival. The following sections of this review address the breast cancer therapy or treatment and its protocols long terms side effects and their protective approach for overall health.

2. Treatment of the breast cancer according to carcinoma stages

There are various stages of the cancer which includes association of lymph nodes, tumor size and existence of distant metastases. These stages are the reliable consistent prognostic signs of the breast cancer and depends on the cancer stages the therapy and treatment is started.

In zero stage of the breast cancer lumpectomy alone can be applied in the infiltrating ductal carcinoma. However, in the larger lesions, lumpectomy is used with the radiation therapy.

Extensive Ductal Carcinoma in Situ involved two or more quadrants of the breast. It requires the mastectomy a surgical operation to remove a breast and Tamoxifen therapy is considered for all the breast cancerous patients (19, 20).

As the standard protocol of the breast cancer treatment in stage I and stage II, radiation therapy and lumpectomy are applied on the patients to prevent the cancer after axillary lymph node status. Such treatments are effective in the breast cancer and have equivalent effects for lumpectomy and mastectomy. Therefore, the survival rate of the patients has been increasing up to 5 to 8 years with disease-free. The mastectomy should be recommended to former radiation therapy patients and eliminate the multi-centric disease and definite connective tissue diseases in breast cancer (21). In a breast cancer strategic and planned chemotherapy is used with radiotherapy. The chemotherapy treatments provided to the patients who have node positive breast cancer and Large tumors (22).

Also, hormone receptor status has been evaluated for Adjuvant endocrine therapy treatment.

The breast cancer with IIIa and IIIc stages is mostly treated by the resectable or may be non resectable (21). The resectable type can be treated by adjuvant chemotherapy with radiation therapy and modified radical mastectomy. Sometimes in several patient neo-adjuvant chemotherapy is used to shrink the tumor size initially. Also, Adjuvant endocrine therapy is used in the inflammatory breast carcinoma and IIIb and IIIc cancer therefore the mukti treatment approaches are using to cure these stages of cancer. neo-adjuvant chemotherapy is used initially than if positive response of this treatment then modified mastectomy followed by radiation therapy may be employed (21). In some cases, chemotherapy should be advised to apply after these treatments. The figure 2 indicates the various stages of breast cancer.

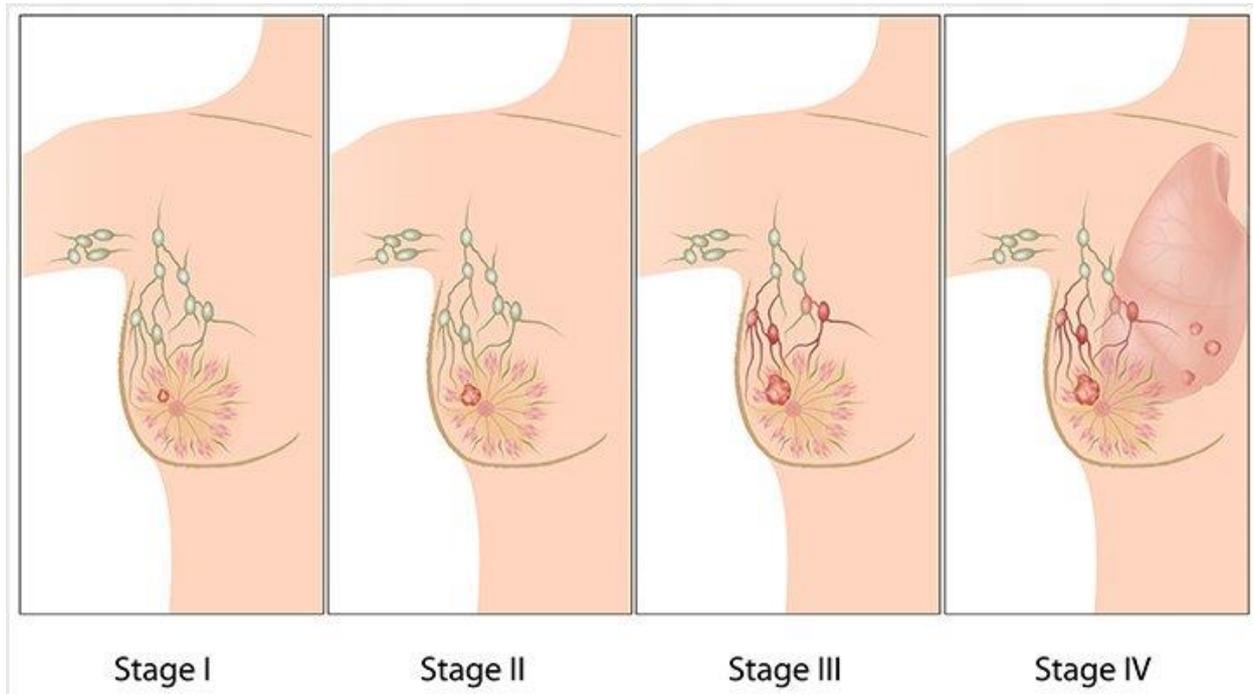


Figure 2. Breast cancer stages (17)

The stage IV breast cancer is difficult to cure but some treatment like endocrine therapies are used to improve patient's survival rates. estrogen receptor and progesterone receptor positive and negative in the breast cancer can be control by the asymptomatic visceral metastases and systemic chemotherapy respectively (23).

3. Long term medical issues in breast cancer treatment

As we have discussed in the above section breast cancer treatment has adverse effects on the patients. Here in this section discussed the cardiovascular diseases secondary to treatment. Moreover, it includes cardiac issues,

chemotherapy, Radiation Therapy, Hormonal Blockade, Targeted Biologic Therapies: Trastuzumab and Lapatinib and bone health

3.1 Cardiac Issues in Breast cancer treatment.

In the world it was observed that the feared disease causes the death in the women. cardiovascular diseases is one the most killer dieses in the women and approximately 400k women died in a year in united states. However, the breast cancer patient’s survivorship rate is increase because of the advance diagnostic system such as cardiovascular diseases, effective treatment modalities and increased patient awareness (24). Also, these technological developments lead the mortality due to cardiovascular diseases. On the other hand, the breast cancer survivor’s death due to cardiovascular diseases has been observed at the time of diagnosis, regardless of cancer stage and adjuvant therapies.

Furthermore, cardiovascular diseases and the breast cancer diagnosis in the young women at the age of 30 to 40 increases which need more attentions. The modern protocol is used to procured the breast cancer. Also, the others treatments are applied on the patient to cure the other side effects. It has been observed that

Table 1. Potential cardiotoxicity of therapeutic agents

Chemotherapeutic Agent	Potential cardiotoxicity
Taxanes: paclitaxel and docetaxel	Ischemia, arrhythmias and congestive heart failure
Targeted therapies: trastuzumab and lapatinib	congestive heart failure
Hormonal blockade: tamoxifen	thromboembolic events
Anthracyclines: doxorubicin and epirubicin	cardiomyopathy and congestive heart failure
Alkylating agents: cyclophosphamide	congestive heart failure

In the breast cancer at the early stage surgical options are given to the patient to cure the cancer. In 1970s the breast-conserving therapy has been effectively started with quadrantectomy vs mastectomy. After the numerous studies it has been fully verified that the breast-conserving therapy is the first primary surgical option for treatment (28). The radiation therapy is an adjuvant part of breast-conserving therapy (29). The use of radiation therapy in treatment causes the Cardiac injury. Such therapy damages the

the subspecialty cardio-oncology-a specialty is managing the cardiovascular effects of the treatment of malignancies (25). As per the research information many breast cancer survivors have a risk of cardiovascular diseases and number of death causes because of cardiovascular diseases in Breast cancer.

3.2 Chemotherapy and Radiation Therapy for breast cancer

The multiple antineoplastic agents are used as breast cancer treatment and increased overall survivor of the patient. Unfortunately, in chemotherapeutic the used many drug agents cause the cardiovascular and some of them are most chronic (26). The breast cancer treatment causes the cardiovascular decease such as hypertension, bradycardia acute coronary syndrome and congestive heart failure (27). In breast cancer chemotherapeutic treatment cardiotoxicity of systemic therapies are one of the major affecting components for cardiovascular decease. Also, such devastating consequences of treatment majorly affects when smoking, hypertension and history of coronary artery disease were listed in the patient history. Table 1 indicates the long-term effects of conjunctive therapies for breast cancer.

coronary arteries and myocardium therefor increases the congestive heart failure risk.

Henceforth, the chemotherapy and radiation therapy cause the risk of cardiac attack but it can be start after the 10 years of treatment (30).

3.3 Hormonal Blockade, Targeted Biologic Therapies: Trastuzumab and Lapatinib and Bone Health

The growth of the breast cancer cell can be prevented by the Tamoxifen which is selective estrogen receptor modulator. In Tamoxifen antiestrogenic activity through its competitive inhibition of estrogen binding to estrogen receptors (31). Tamoxifen is the most effective as breast cancer treatment and reduced the risk of mortality. Such treatment is more significant because of most of the patients have estrogen receptor-positive cancer. On the other side Tamoxifen has side effects like menopause, mood swings, vaginal dryness, mood swings and hot flashes. In addition to this tamoxifen increases risk of cerebral vascular events, pulmonary embolism, thromboembolic complications and develop endometrial cancer. Therefore, women are affected with the hormonal blockade and many other issues. Tamoxifen is increasing the cardiovascular disease risk and myocardial infarction (20).

The Targeted biologic agents are directed at protein kinases and the receptors that activate them. Almost 30% of the breast cancers are human epidermal growth factor receptor 2-positive (32) and its tyrosine kinase pathway has been used as significant therapeutic target (33), (34). Several targeting ligands such as peptides and antibodies are used to target specific type of cancer cells (35). Trastuzumab therapy is extended the life span of the patients but it adversely affects the cardiac function. However, its cardiotoxicity mechanism is still unclear (36). Therefore, cardiovascular disease risk is increased.

In the breast cancer an osteoporosis and bone loss developed because of the adjuvant therapies. However, to maintain the bone integrity in the breast cancer is a challenging issue. Mostly osteoporosis has been seen in the elderly population in breast cancer and can be recognized by modifiable and non-modifiable. Recently many gene therapy approaches are also coming up and in clinical trials for treatment of various types of cancers such as colorectal cancer (37) (38) lung cancer, and breast cancer. Thus, a lot of research is going on to improve the cancer therapeutic alternatives for breast cancer and reduce associated side effects at the same time (39).

4. Conclusion

To decrease and augment survival rate and recurrence rate, adjuvant therapy is most effective for all patients of breast cancer. Aromatase Inhibitors are used for breast cancer in women because of hormone receptor positive and effective than Tamoxifen. Women have negative hormone receptor in breast cancer and Chemotherapy treatment is given to premenopausal women. Anthracycline treatment as chemotherapeutic agents are efficient and proven treatment for breast cancer but it is particularly high risk for patients.

From the last decade the survivorship in the breast cancer is the challenging issue. However, early diagnosis can lead the survivor rate of breast cancer patients. The new challenge in the medical sectors about the breast cancer is long term complications of current and past treatment. Current therapy such as radiation therapy, polychemotherapeutic agents can affect the cardiovascular system. The Cardiovascular disease is the most common mortality in breast cancer women.

The breast cancer treatment such as chemotherapy, Radiation Therapy, Hormonal Blockade, Targeted Biologic Therapies: Trastuzumab and Lapatinib and bone health have many side effects and based on the various medical patient data it is proven that the long-term side effects cannot be cured such as cardiac issues. On the other side to treat and cure the cancer at various stages patients has to take the treatment to survive the life. Although the new generation and development of the technology may reduce the mortality rate and improve the survivorship in breast cancer.

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Conflicts of Interest

The author declares that there are no conflicts of interest.

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