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A Short Review on Breast Cancer

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ABSTRACT

Worldwide, 685,000 people died in 2020 as a result of breast cancer, which affected 2.3 million women. The most common cancer in the globe as of the end of 2020 was breast cancer, which had been diagnosed in 7.8 million women in the previous five years. Every country in the globe experiences breast cancer in women after puberty at any age, albeit the incidence rates rise as people age. Obesity, alcohol consumption, smoking, family history of breast cancer, radiation exposure, reproductive history and postmenopausal hormone therapy are some of the factors that cause breast cancer. The most prevalent mutations in the genes BRCA1, BRCA2, and PALB-2 significantly increase the risk of developing breast cancer. Women who are determined to have mutations in these important genes may want to think about risk-reduction measures like having both breasts surgically removed. This review describes the causes, genetic alteration, signs, symptoms, diagnosis and treatment for breast cancer.

Keywords: Breast cancer; Causes; Signs; Symptoms; Diagnosis; Treatment.

1. Breast cancer

Cancer is the excessive expansion of anomalous body cells. Cancer arises when the normal system for regulation of the body stops functioning. Old cells survive and develop out of range, creating new, dysfunctional cells respectively. Such excess cells construct a tissue mass, which is named a tumor. Cancer can begin nearly anywhere in the human body that consists of trillions of cells. Human cells usually expand and split to create new cells, because the body requires them. They perish as the cells get older or get hurt, and new cells take their space. But this organized mechanism breaks down as cancer grows. As cells appear progressively dysfunctional, old or destroyed cells thrive when they fall, and when they aren't required, new cells develop. Such extra cells can divide without slowing and can create tumor lesions. Many cancers produce solid tumors and eventually constitute masses of tissues. Blood cancers, such as leukemia, don't usually develop stable tumors (Watkins, 2019).

Cancerous tumors are malignant which implies they can expand into surrounding tissues or destroy them. Moreover, with these tumors growing, certain cancer cells may burst off and migrate through the blood or lymph system to different locations in the body, forming new tumors farther from the original tumor. Benign cancers, unlike malignant tumors, do not propagate or enter surrounding tissues. Benign tumors, however, can often be fairly huge. They generally stop growing when removed, while sometimes malignant tumors do (Watkins, 2019; Travis et al., 2016).

Breast cancer is cancer that is produced in the breast cells. Breast cancer is the most prominent cancer detected in females after skin cancer. Breast cancer can affect both men and women but

in women, it is far more severe. Although overall mortality for breast cancer patients has declined, it is still the second most common cause of cancer death in women. According to the World Health Organization (WHO), 2.09 million breast cancer cases were diagnosed worldwide until the year 2018. The number of deaths for breast cancer cases is 627,000 deaths worldwide until the year of 2018. In 2018, 23, 218 cases have been diagnosed for breast cancer for females and the number of deaths is 12, 458 for females in Malaysia.

The rising breast cancer prevalence leads to a lack of consciousness among women. One woman out of nineteen is at risk of breast cancer and it has been recorded that almost 50 percent of people diagnosed with breast cancer are under 50 years of age. Knowledge of risk factors is insufficient, but strong information is discovered about the significance of family history and diet as risk factors. Enhancement includes an understanding of the root and clinical symptoms of breast cancer. As for therapy, options for surgery and chemotherapy in particular are uncertain to the public, the public is vaguely unknowing about quitting smoking in order to avoid early breast cancer. With improved understanding, early diagnosis should be done, as it results in a better prognosis and decreased risk.

2. Causes of Cancer

Cancer is a deadly illness, but women's breast cancer is perhaps the most severe issue in the future, not only in the moment. Cancer is metastasis which is a complicated sequence of steps through which cancer cells spread through the circulatory and lymphatic system from one organ through another organ of the body. Breast cancer is essentially a chronic disorder. Estrogens are closely connected with breast cancer pathogenesis. Breast cancer is the most prevalent neoplastic condition in women around the world and is second only to lung cancer as a cause of death among women from cancer. The prevalence of breast cancer is increasingly growing in many other developing countries and in cultures that have recently been modernized or are in transition. Breast cancer is the most commonly diagnosed disease in women, the prevalence rate of which has dramatically risen in women in recent times. The identified risk factors include menstrual and developmental history, breast cancer family history, postmenopausal depression, hereditary sensitivity, tobacco use and ionizing radiation exposure (Kori, 2018; Yip et al., 2014).

Alcohol drinking is among the most significant causes of breast cancer (National Cancer Institute, 2018). In many nations, alcohol use is growing, which is a significant factor in cancer globally. Many people may not realize that consuming alcohol will increase their cancer risks, too. Usage of alcoholic beverages is associated with the risk of mouth, throat, pharynx, speech box, larynx, esophagus, liver, colon, rectum, pancreas, stomach and breast. Alcoholic drinks such as beer, wine, and cocaine have a possible mechanism to raise the risk of women's health through the hormone and receptor imbalances that contribute to breast cancer. Alcohol increases the number of hormones involved with estrogen and other hormones, receptors that are responsible for causing breast cancer. This can also raise the risk of breast cancer from damage to DNA in cells. Women who have 3 instances of alcoholic liquids in keeping with week have a fifteen-percentage extra chance of breast cancer as compared to teetotaler women. Experts say that there is a potential 10 percent rise in the risk of breast cancer with every extra drink people routinely receive every day. Yet another fascinating thing is that the proportion

of girls aged 10-16 years old who consume three to five alcoholic drinks a week decreases the chance of having benign breast lumps by increasing concentration. Most lumps in the breast are benign which means they are not cancerous. Benign breast lumps typically have smooth sides that can be easily displaced when pressed back. They constantly seem determined in each breast. There are many common causes, such as natural breast tissue changes, breast infection or injuries, alcoholic beverages and medications that may cause lumps, as well as breast pain. Over the whole of a woman's life, breast tissue shifts. Changes in breast tissue during the menstrual cycle are prone to alteration in hormone levels. Non-cancerous breast lumps later in existence are related to an accelerated chance of breast cancer (Kori, 2018).

Smoking is yet another aspect that raises the risk of several cancer types including lung, kidney and pancreatic cancer. While study results on a possible connection to breast cancer remain mixed, significant evidence that smoking can sometimes raise the risk of breast cancer mildly. Some researchers have discovered smoking can raise the risk of breast cancer before first childbirth. Tobacco smoking may be one of the few modifiable breast cancer risk factors. Smoking cigarettes has been mentioned as a cause of breast cancer. Smoking tobacco has been mentioned as a causative agent for breast cancer. Smoking and tobacco smoke are validated as carcinogenic to people in the International Agency for Research on Cancer (IARC) assessment. Within cigarette smoke, toxic carcinogens can induce mammary tumors in animals. Tobacco smoking can be one of the few modifiable breast cancer hazard factors (Kori, 2018).

The most frequently reported cause in target females was the assignment of breast cancer growth to hereditary or genetic causes. Approximately 5 to 10 percent of cases of breast cancer are believed to be genetic, due to gene variations passed by a relative. Females of this condition who do have a similar blood family may have a greater chance of breast cancer. Inherited mutations are by far the most frequent cause of inheritable breast cancer in breast cancer gene 1 (BRCA1) or breast cancer gene 2 (BRCA2). Patients with breast cancer gene (BRCA) mutations have a greater possibility of lifespan of getting breast cancer. These people?? are also young because they do experience it more than other people with breast cancer who are not raised with either of those genetic variants. Less typical problems of hereditary breast cancer include mutations in other genes (Kori, 2018).

Obesity is the most prevalent condition which increases the chance of breast cancer, particularly for women following menopause. Obesity is a dynamic, multifaceted disorder and the aggressive denial of excessive weight for height, regardless of menopause age, has a clear and reliable effect on the number of people who suffer from this illness. Therefore, it is important to examine thoroughly how obesity influences the breast cancer cycle. Birth control pills can indeed induce breast cancer. The key types of contraceptives are the mixed contraception pill, which includes estrogen and progestogen in the female hormones, and the micro pill, which includes only progestogen. Many forms of hormone-based contraceptives are available including pads, needles inserted under the skin, injections and coils releasing hormones. The combined pill includes estrogen and progestogen, the female sex hormones?? hanging statement. These hormones inhibit pregnancy by blocking egg release from the ovaries during ovulation. Such hormones may also enhance the development of certain breast cancers, which may indicate why consuming the drug raises the chance of breast cancer significantly. Over several years, the link between the use of artificial contraceptives and breast cancer has been questioned with findings that are not necessarily straightforward and definitive (Kori, 2018).

The threat of breast cancer goes up as a woman grows older. A rising percentage of women with breast cancer will become aged as the population ages. The heterogeneity of risk factors for breast cancer between premenopausal and postmenopausal women is known, but few findings have looked directly at elderly people. The writers identify the age-specific impact of postmenopausal breast cancer risk factors, with a focus on women aged 75 or over. Older women would comprise a rising portion of the people who have breast cancer diagnoses. For one breast, a person with cancer has an elevated chance of having a new cancer in the other breast or any section of the same breast (Kori, 2018).

Benign breast problems are normal, although most improvements to the breast are not cancer. Women's breasts are continually going through transition, through pregnancy and menopause, from the moment they develop. It is attributed to the differing amounts of estrogen and progesterone in the body from the female hormones. Most breast improvements are likely to be natural, or a benign disease of the breast. Many benign disorders of the breast can create issues and require care but this is not always the case. Benign disorders in the breast are very normal, and most women do. Generally, maximum modifications to the breast are benign. Benign breast disorders are not life-threatening, as opposed to breast cancers. Yet others are associated with a greater chance of eventually developing breast cancer. The existence of these other molecular incidents determines the direction in which BRCA1 and BRCA2 function. The mutation spectrum is complex, so it is difficult to grasp the importance of certain nucleotide modifications. The form of mutation tends to be racially motivated (Kori, 2018).

3. Genetic Alteration

Genetic linkage experiments in many tumor-prone individuals have contributed to the discovery of strongly penetrating genes as a potential source of hereditary cancer threat. Most females with a family history of breast cancer have tumors distinguished by specific gene alterations, primarily BRCA1 and BRCA2. The activity of these two genes, known as tumor suppressors, is related to main metabolic pathways including restoring DNA damage, regulating gene expression and controlling the cell cycle (Cipollini et al., 2004; Bajrami et al., 2018). A gene called Human Epidermal Growth Factor Receptor 2 (HER2) has the potential to be amplified or overexpressed in cancer cells. This mutation may result in uncontrolled cell proliferation and an aggressive kind of breast cancer. Targeted treatments for HER2-positive breast tumours frequently include lapatinib, pertuzumab, and trastuzumab (Herceptin). Breast cancer cells have proteins on their surface called oestrogen and progesterone receptors, which are responsive to hormonal signals. The growth of hormone receptor-positive breast tumours is dependent on progesterone or oestrogen. Treatment for hormone receptor-positive breast cancers typically involves hormone treatment, which prevents progesterone and oestrogen from having their effects. A protein that aids in controlling the cell cycle and preventing uncontrollably fast cell division is encoded by the TP53 gene. An increased risk of breast cancer and other cancers is linked to TP53 mutations. TP53 mutations are often associated with more aggressive forms of breast cancer and a poorer prognosis. One tumour suppressor gene that aids in controlling cell proliferation is the PTEN gene. PTEN mutations raise the risk of breast cancer and cause uncontrolled cell division. Cowden syndrome is a genetic condition marked by an increased risk of thyroid, breast, and other cancers. It is linked to germline mutations in PTEN.

4. Signs and Symptoms

A significant part of breast care is understanding how breasts usually look and feel. The earliest possible diagnosis of breast cancer offers you a greater chance of good treatment. However, identifying what to look for does not take the place of fairly frequent mammograms and other tests for screening. Screening tests will help in the early stages of breast cancer before any symptoms develop.

A new lump, or mass, is the maximum not unusual place symptom of breast cancer. A pain-free, rough mass with uneven edges is more prone to cancer but cancer of the breast can be soft, or rounded. Even they can be painful. Therefore, it is necessary to get every new breast fat, swelling, or breast shift examined by a healthcare provider who is experienced in breast cancer diagnosis (Breast Cancer Stages, 2017).

Other feasible breast cancer signs and symptoms include swelling of all or a part of a breast, pores and skin infection or dimpling that from time to time seems like an orange peel, breast or nipple pain, retraction of the nipple, redness, scaliness, or thickening of the nipple or breast skin, and discharge of the nipples (American Cancer Society, 2018).

Sometimes breast cancer may grow under the arm or across the collar bone to lymph nodes and induce a lump or swelling there, often when the initial breast tumor becomes big enough to be noticed. A healthcare provider should also check for swollen lymph nodes.

Although some things apart from breast cancer can cause any of those symptoms, they must be suggested to a fitness care expert so the purpose may be found. Since mammograms do not detect any cancer of the breast, it is vital for you to be aware of breast changes and to know the signs and symptoms of breast cancer.

5. Diagnosis and Treatment

Breakthroughs in breast cancer screening and diagnosis have significantly increased average overall survival since 1989. Being conscious of the effects hence the need for monitoring are valuable way to reduce the risk. Breast cancer can also affect men in rare circumstances but this report will focus on women's breast cancer (Table 1).

Table 1: The description of the breast cancer diagnosis (Lee et al., 2019; Waks and Winer, 2014; Soerjomataram et al., 2008)

No.	Diagnosis	Description
1.	Breast Examination	The specialist would test for lumps and other signs in the breasts.
2.	Imaging test (i)Mammogram (ii) Ultrasound (iii) MRI	(i) It is a form of X-ray widely used by doctors during an initial test for breast cancer. This allows visualization which can assist a specialist in spotting any irregularities or lumps. A specialist will usually take more tests to check the questionable findings. Mammography, though, often

		reveals a questionable region that turns out not to be cancer. (ii) This test uses sound waves to assist a doctor in discerning between a solid mass and a cyst that is full of fluid. (iii) Magnetic Resonance Imaging (MRI) includes various breast scans to allow a surgeon to detect tumors or other anomalies. For a follow-up to a mammogram or ultrasound, a doctor may prescribe an MRI. Doctors might even use it as a screening instrument for those at greater breast cancer risk.
3.	Biopsy	During a biopsy, the doctor takes a tissue sample and sends it to be examined in the laboratory. That will indicate that whether the cells are cancerous or not. If they are, a biopsy reveals what type of cancer has grown, and whether the cancer is hormone-active or not. Diagnosis also includes cancer staging to determine: • The tumour diameter • How far it extended • Whether invasive or non-invasive Staging offers an idea of a person's chances of survival and their desired therapy plan.

Treatment may rely on many aspects including the cancer type and stage, the hormone and age sensitivity of the person, general health and patient likes and dislikes. Radiation therapy, surgery, biological therapy, selective drug therapy, hormone therapy, and chemotherapy are the primary care choices. Factors influencing a person's form of treatment may include the cancer level, certain medical problems and personal interests (Table 2).

Table 2: List of the treatments for breast cancer (Qaseem et al., 2019)

No.	Treatment	Description
1.	Surgery	If surgery is required, the form may rely on the assessment as well as the patient's preferences. Surgical forms include: **Lumpectomy:** It includes cutting the tumor surrounding it and a small volume of healthy tissue. A lumpectomy may prevent cancer from spreading. If the tumor is tiny and easy to remove from its underlying tissue, this could be an alternative. **Mastectomy:** A straightforward mastectomy requires the removal of lobules, ducts, fatty tissue, nipple, areola and some skin. In certain cases, the lymph nodes and muscle in the chest wall may also be separated by a surgeon.

		Sentinel node biopsy: If breast cancer approaches the sentinel lymph nodes, which are the first nodes to which cancer can spread, it can distribute into other parts of the body via the lymphatic system. If the doctor does not locate cancer in the sentinel nodes then removing the remaining nodes is usually not necessary. **Dissection of the axillary lymph node:** If a doctor finds cancer cells in sentinel nodes, several lymph nodes in the armpit may be recommended for removal. Which can avoid the spread of cancer. **Reconstruction:** A surgeon can rebuild the breast after mastectomy to make it look more normal. This can enable a person to deal with the implications of breast removal psychologically. The surgeon can regenerate the breast at the very same time as or at a later date performing a mastectomy. They may be using a breast prosthesis or tissue from another body part.
2.	Radiation Therapy	A person can receive radiation therapy after a month following surgery. Radiation involves hitting the tumor with managed radiation doses to destroy any existing cancer cells.
3.	Chemotherapy	A doctor may recommend cytotoxic chemotherapy drugs that kill cancer cells if the probability of relapse or spread is strong. After surgery, doctors call it adjuvant chemotherapy, if a person has chemotherapy. Often, before surgery, a doctor can prescribe chemotherapy to shrink the tumor to make it easier to remove it. Doctors call this Chemotherapy Neoadjuvant. According to National Cancer Institute, Abemaciclib, Abraxane (Paclitaxel Albumin-stabilized Nanoparticle Formulation), Ado-Trastuzumab Emtansine, Afinitor (Everolimus), Afinitor Disperz (Everolimus), Alpelisib, Anastrozole, Aredia (Pamidronate Disodium), Arimidex (Anastrozole), Aromasin (Exemestane), Capecitabine, Cyclophosphamide, Docetaxel, Doxorubicin Hydrochloride Elacestrant Dihydrochloride, Ellence (Epirubicin Hydrochloride), Enhertu (Fam-Trastuzumab Deruxtecan-nxki), Epirubicin Hydrochloride, Eribulin Mesylate, Everolimus, Exemestane, 5-FU (Fluorouracil Injection), Fam-Trastuzumab Deruxtecan-nxki, Fareston (Toremifene), Faslodex (Fulvestrant), Femara (Letrozole), Fluorouracil Injection, Fulvestrant, Gemcitabine Hydrochloride, Gemzar (Gemcitabine Hydrochloride), Goserelin Acetate, Halaven (Eribulin Mesylate) ,Herceptin Hylecta (Trastuzumab and

		Hyaluronidase-oysk), Herceptin (Trastuzumab), Ibrance (Palbociclib), Infugem (Gemcitabine Hydrochloride), Ixabepilone, Ixempra (Ixabepilone), Kadcyla (Ado-Trastuzumab Emtansine), Keytruda (Pembrolizumab), Kisqali (Ribociclib), Lapatinib Ditosylate, Letrozole, Lynparza (Olaparib), Margenza (Margetuximab-cmkb), Margetuximab-cmkb, Megestrol Acetate, Methotrexate Sodium, Neratinib Maleate, Nerlynx (Neratinib Maleate), Olaparib, Orserdu (Elacestrant Dihydrochloride), Paclitaxel Paclitaxel Albumin-stabilized Nanoparticle Formulation, Palbociclib, Pamidronate Disodium, Pembrolizumab, Perjeta (Pertuzumab), Pertuzumab, Pertuzumab, Trastuzumab, and Hyaluronidase-zzxf, Phesgo (Pertuzumab, Trastuzumab, and Hyaluronidase-zzxf), Piqray (Alpelisib), Ribociclib, Sacituzumab Govitecan-hziy, Soltamox (Tamoxifen Citrate) Talazoparib Tosylate, Talzenna (Talazoparib Tosylate), Tamoxifen Citrate, Taxotere (Docetaxel), Tecentriq (Atezolizumab), Tepadina (Thiotepa), Thiotepa, Toremifene, Trastuzumab, Trastuzumab and Hyaluronidase-oysk, Trexall (Methotrexate Sodium), Trodelvy (Sacituzumab Govitecan-hziy), Tucatinib, Tukysa (Tucatinib), Tykerb (Lapatinib Ditosylate), Verzenio (Abemaciclib), Vinblastine Sulfate, Xeloda (Capecitabine) and Zoladex (Goserelin Acetate) are the drugs approved to treat breast cancer patients.
4.	Hormone Blocking Therapy	Doctors use hormone-blocking therapy to avoid the comeback of hormonally sensitive breast cancers after therapy. Hormone therapy may be used to treat tumors that are positive for the estrogen receptor (ER) and the progesterone receptor (PR). Typically, following surgery, they perform hormone-suppressing medication but can also use it to shrink the tumor beforehand. For patients who are not good candidates for surgery, chemotherapy or radiotherapy, hormone-blocking treatment can be the only alternative. Doctors may prescribe that a person undergoes hormone therapy for 5–10 years following surgery. The treatment, however, does not affect tumors that are not hormone-prone. Examples of hormone-blocking therapy medications may include: • tamoxifen • aromatase inhibitors • ovarian ablation or suppression

		• Goserelin, is a luteinizing hormone-releasing agonist drug that suppresses the ovaries.
5.	Biological Treatment	Targeted medications can kill different breast cancer forms. Types may include: • Herceptin (trastuzumab) • Tykerb (lapatinib) • Avastin bevacizumab Breast and other cancer medications can have severe side effects. Patients will address the possible complications with a doctor before choosing a treatment, and look for means of reducing the side effects.

6. Side Effects of the Breast Cancer Treatment

6.1 Surgery

- ✓ Pain and discomfort
- ✓ Swelling and bruising
- ✓ Scarring
- ✓ Limited range of motion
- ✓ Lymphedema
- ✓ Numbness or Tingling
- ✓ Infection
- ✓ Bleeding

6.2 Radiation therapy

- ✓ Fatigue
- ✓ Breast swelling and tenderness
- ✓ Lymphedema
- ✓ Pain and discomfort
- ✓ Nausea and loss of appetite
- ✓ Heart damage
- ✓ Lung damage

6.3 Chemotherapy

- ✓ Nausea and vomiting
- ✓ Fatigue
- ✓ Hair loss (Alopecia)
- ✓ Loss of appetite
- ✓ Bone marrow suppression
- ✓ Mouth Sores and mucositis
- ✓ Peripheral neuropathy
- ✓ Infertility
- ✓ Cognitive changes
- ✓ Increased risk of infections

6.4 Hormone Blocking Therapy

- ✓ Vaginal dryness and discomfort
- ✓ Joint and muscle pain
- ✓ Bone density loss
- ✓ Mood changes
- ✓ Nausea
- ✓ Increased Risk of Blood Clots
- ✓ Menstrual irregularities
- ✓ Weight gain
- ✓ Fatigue

6.5 Biological treatment

6.5.1 Monoclonal antibodies (e.g., Trastuzumab, Pertuzumab)

- ✓ Cardiotoxicity
- ✓ Infusion reactions

6.5.2 Tyrosine kinase inhibitors (e.g., Lapatinib, Neratinib)

- ✓ Diarrhea
- ✓ Skin rash
- ✓ Hand-foot syndrome

6.5.3 CDK4/6 Inhibitors (e.g., Palbociclib, Ribociclib, Abemaciclib)

- ✓ Neutropenia
- ✓ Fatigue

6.5.4 PARP Inhibitors (e.g., Olaparib, Talazoparib)

- ✓ Anemia, Neutropenia, Thrombocytopenia
- ✓ Nausea and fatigue

6.5.5 Immune Checkpoint Inhibitors (e.g., Atezolizumab, Pembrolizumab)

- ✓ Immune-Related Adverse Events

Conclusion

In conclusion, avoidance of breast cancer has two essential facets which are early diagnosis and reduction of consequence. Screening may detect early non-invasive cancers to require diagnosis before they are invasive, or identify early curable invasive cancers. Early detection of breast cancer also needs to be recognized as raising the risk. Risk management may require prophylactic surgical breast and ovary elimination in particularly high-risk patients, such as those who have BRCA mutations. Alterations in lifestyle can be readily prescribed for the average patient, and have several other advantages. In comparison with the normal health guidelines, the use of hormone-blocking inhibitors can also be recommended for patients who have an elevated risk depending on certain conditions.

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