BREAST CANCER: ADVANCEMENTS AND FUTURE DIRECTIONS IN NATUROPATHY AND YOGA FOR ITS TREATMENT

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ABSTRACT

Breast cancer is characterized by the abnormal growth of cells within the breast tissue, typically originating in the ducts or lobules of the breast and potentially developing into malignant tumors. Extensive epidemiological research has consistently associated several keyfactors with an increased risk of breast cancer over an extended period. These factors include early age at first menstruation (pre-menarcheal), as well as more recent considerations such as the timing of a woman's first full-term pregnancy, limited childbirths, and advancing age post menopause. Additionally, studies have revealed that individuals diagnosed with breast cancer who incorporate yoga into their routines may experience reduced stress levels, an improved quality of life, and decreased fatigue.

In general, factors such as aging, a family history of breast cancer, specific alterations in gut health, genetic predispositions, reproductive history, menopausal status, lack of physical activity, alcohol consumption, dietary habits, racial background, and exposure to radiation therapy all contribute to the risk of developing breast cancer.

KEYWORDS: Breast cancer, Herbal therapy, Naturopathy, Yoga, nutritional intervention.

INTRODUCTION

Breast cancer is the most prevalent malignancy affecting women worldwide, and it exhibits a curable potential of approximately 70% to 80% when diagnosed at an early, non-metastatic stage. In contrast, advanced breast cancer characterized by distant organ metastases is considered incurable with currently available treatments [1]. From a molecular perspective, breast cancer is a diverse disease, with distinct molecular features such as the activation ofthe human epidermal growth factor receptor 2 (HER2, encoded by ERBB2), hormone receptor activation (estrogen receptor and progesterone receptor), and/or the presence of BRCA mutations. Treatment approaches vary depending on the specific molecular subtype.

The management of breast cancer is a multidisciplinary effort, encompassing surgical and radiation therapies, as well as systemic treatment modalities. Systemic treatments include endocrine therapy for hormone receptor-positive cases, chemotherapy, anti-HER2 therapy for HER2-positive cases, agents aimed at stabilizing breast cancer, poly (ADP-ribose) polymerase inhibitors for individuals with BRCA mutations, and more recently, the incorporation of immunotherapy. [2]

CAUSES OF BREAST CANCER

In simple terms, breast cancer occurs when there is abnormal growth of cells in the breast tissue. Researchers believe that a complex interplay of genetic and environmental factors contributes to these changes in cell behavior, although the specific cause of an individual caseof breast cancer may remain unknown.

As these abnormal cells continue to divide, they can form a mass or lump and have the potential to spread to other parts of the body, a process known as metastasis. For instance, breast cancers in women often originate in the milk-producing ducts, a condition referred to as invasive ductal carcinoma. In some cases, breast cancers may begin in other types of breast tissue cells, including the glandular tissue known as lobules, leading to invasive lobular carcinoma.

It's also worth mentioning genetic mutations in this context. Researchers estimate that approximately 5% to 10% of all breast cancers are caused by inherited gene mutations that are passed down through generations via DNA. Among the various inherited gene mutations that can elevate the risk of breast cancer, the two most well-known ones are BRCA1 and BRCA2.

BRCA1 and BRCA2 are genes that normally act as tumor suppressors, preventing abnormal growth of breast cells. However, when these genes undergo mutations and do not function as they should, the risk of developing breast cancer (as well as ovarian cancer) is significantly increased. According to the CDC, about one in every 500 women carries a mutation in her BRCA1 or BRCA2 genes. [3]

Certain genes control the life cycle the growth, function, division, and death — of a cell. When these genes are damaged, the balance between normal cell growth and death is lost. Normal breast cells get cancerous because of changes in DNA structure. Breast cancer is caused by cellular DNA detriment that leads to out-of- control cell growth.

- **Genetics and Mutations**

Specific genes oversee the various stages of a cell's life cycle, which includes growth, function, division, and eventual death. When these genes sustain damage, it disrupts the equilibrium between regular cell growth and the natural process of cell death. Breast cancer arises due to alterations in the DNA structure within normal breast cells. The root cause of breast cancer is the impairment of cellular DNA, which results in unregulated and excessive cell growth.

- **Lifestyle**

Breast cancer risk can also be influenced by lifestyle decisions. Factors such as a diet lacking in nutritional quality, physical inactivity, obesity, excessive alcohol consumption, tobacco use (including smoking), and exposure to various chemicals and toxins have all been linked to a reduced risk of breast cancer.

- **Medical Treatment**

Medical treatments involving chemotherapy, radiation therapy, or immunosuppressive medications, aimed at slowing down the spread of cancer throughout the body, can inadvertently harm healthy cells. In some cases, these treatments have led to the development of "secondary cancers" that are entirely distinct from the original cancer. Additionally, the use of radiation therapy in the chest area for treating other medical conditions or cancers has been associated with an increased risk of developing breast cancer. [4]

SPREAD OF BREAST CANCER

Breast cancer has the potential to spread when cancer cells infiltrate the bloodstream or lymphatic system, subsequently being transported to different areas of the body. The lymphatic system, an integral part of the body's immune system, comprises a network of small, bean-sized glands known as lymph nodes, ducts or vessels, and organs that collaborate to gather and convey clear lymph fluid from body tissues to the bloodstream. This lymph fluid, found within the lymph vessels, carries waste materials and by-products from tissues, as well as immune system cells.

In the context of breast cancer, cancer cells can gain access to these lymph vessels and initiate growth within lymph nodes. Most of the lymph vessels from the breast drain into specific regions, including:

1. Lymph nodes beneath the arm (axillary lymph nodes)
2. Lymph nodes inside the chest near the breast (internal mammary lymph nodes)
3. Lymph nodes around the collarbone (supraclavicular lymph nodes)

However, it's important to note that if cancer cells have spread to your lymph nodes, there is an increased risk that these cells may have travelled through the lymphatic system and metastasized to other parts of your body. Nonetheless, not all women with cancer cells in their lymph nodes will necessarily develop metastases, and some women who initially have no cancer cells in their lymph nodes may still experience metastasis at a later stage.[5]

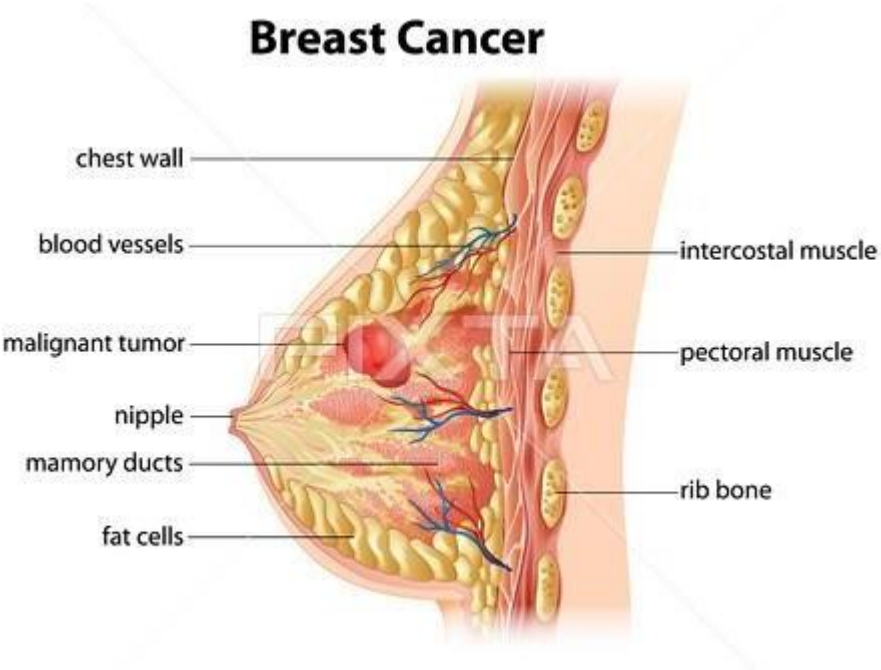


Figure 1. Anatomy of the Breast

EARLY BREAST CANCER STAGES [6]

Early-stage breast cancer encompasses any type that has not extended beyond the breast tissue or the initial lymph nodes. Early stages include:

- Ductal carcinoma in situ, also referred to as stage 0, where the cancer has not spread from the milk ducts or lobules but may do so if left untreated.
- Stage 1, typically characterized by a small tumor that has not spread to lymph nodes and is generally responsive to treatment.
- Stage 2A, which may involve one of the following:
    - No observable lump and spread to fewer than four axillary lymph nodes.
    - Tumor size between 2 and 5 cm without lymph node involvement.
    - Tumor size less than 2 cm with spread to fewer than 4 lymph nodes.
- Stage 2B, which includes:
    - Tumor size between 2 and 5 cm with spread to fewer than four lymph nodes.
    - Tumor size less than 5 cm without any lymph node involvement.
- Stage 3A, encompassing:

- Tumor of any size or absent tumor and spread to 4 to 9 lymph nodes.
- Tumor larger than 5 cm with the presence of breast cancer cells measuring between 0.2 and 2 mm in lymph nodes.
- Tumor larger than 5 cm with cancer spread to 1 to 3 lymph nodes.

The staging of cancer involves several factors, categorized into five stages ranging from 0 to 4, with sublevels indicated by letters. The TNM system, introduced by the American Joint Committee on Cancer in 2018, is utilized by medical professionals to determine cancer stages. This staging system takes into account the following factors:

- Tumor size (T)
- Spread to nearby lymph nodes (N)
- Spread to distant tissues or metastasis (M)
- Estrogen receptor status (ER)
- Progesterone receptor status (PR)
- HER2 status
- Cancer stage

DIFFERENT TYPES OF BREAST CANCER [7]

1. **Tubular Carcinoma of the Breast:**

   This is the most prevalent form of breast cancer that originates within the breast milk duct and gradually extends into surrounding healthy tissues. Tubular carcinomas are typically small in size and may appear tube-shaped, hence the name. They account for approximately 8 to 27 percent of all breast cancer cases. Advanced technologies have enabled effective detection and treatment of this type of breast cancer, making it relatively rare among men.

2. **Ductal Carcinoma in Situ (DCIS):**

   DCIS is a non-invasive or pre-invasive stage of breast cancer, representing an early phase of the disease. In DCIS, abnormal cancer cells develop inside the milk glands or within the breast milk duct lining, but they remain confined to their original location or "in situ" because they have not yet gained the ability to spread. However, if left untreated, DCIS can progress to become invasive and potentially spread into the surrounding breast tissue.

3. **Inflammatory Breast Cancer:**

Inflammatory breast cancer is one of the most rapidly progressing types of breast cancer, accounting for approximately 1 to 4 percent of all breast cancer cases. This type of cancer is characterized by a reddish and swollen appearance of the breast skin, often accompanied by warmth and tenderness to the touch. The skin may take on an appearance resembling the texture of an orange peel due to blocked lymph channels in the breast tissue. The average age of diagnosis is typically between 52 to 57 years, with research indicating a higher risk among individuals who are overweight.

4. **Mucinous Breast Cancer:**

   Mucinous, also known as colloid, breast cancer is comprised of cells that are visible only under a microscope. It is not uncommon for mucinous breast cancer cells to be observed alongside other types, including invasive ones. Mucinous breast cancer accounts for around 2 percent of all breast cancer cases.

5. **Male Breast Cancer:**

   Breast cancer is not exclusive to women; men can also develop this disease, although it is relatively rare, comprising less than 1 percent of all breast cancer cases. Men possess breast tissues and, as a result, can develop breast cancer. Factors such as abnormal hormone levels or the use of specific medications can contribute to the development of breast cancer in men.

6. **Lobular Carcinoma in Situ (LCIS):**

   LCIS represents an area of abnormal cell growth that elevates a person's risk of eventually developing invasive breast cancer. The term "lobular" refers to the abnormal cell growth that originates in the milk-producing glands known as lobules and sometimes within the breast ducts. LCIS is considered an "in situ" cancer, meaning it remains in the place where it originated (e.g., lobule) without spreading to surrounding areas. Individuals diagnosed with LCIS often have more than one affected lobule.

7. **Breast Cancer During Pregnancy:**

   Breast cancer can also be diagnosed during pregnancy. Pregnancy is not the cause of breast cancer, and treatment during this period can be challenging as it introduces additional complexities and concerns, affecting both the mother and the developing child.

8. **Paget's Disease of the Nipple:**

   This rare type of breast cancer begins in the breast ducts and eventually spreads to the skin of the nipple and areola, the darker area surrounding the nipple. It accounts for

approximately 1 percent of all breast cancer cases. Paget's disease of the nipple is characterized by scaly, red, crusted skin on the nipple and areola, often accompanied by bleeding, itching, or a burning sensation.

9. **Medullary Carcinoma of the Breast:**

   It is a rare subtype of breast cancer, representing only 5 percent of all breast cancer cases. It derives its name from its tissue growth pattern, resembling the "Medulla Oblongata" in the brain. Typically, this cancer is confined to a single breast and exhibits less aggressive growth compared to other types of breast cancer. Medullary carcinoma originates in the breast milk duct and gradually extends beyond it. It is often diagnosed in women aged 40 to 50.

10. **Phyllodes Tumors of the Breast:**

    They exhibit a sheet-like growth pattern referred to as "Phyllodes." These tumors are most commonly detected in women in their 40s and are characterized by the presence of a lump in the breast. Phyllodes tumors are generally benign and rarely become malignant. Surgical removal is typically recommended. These tumors can be detected at an early stage, enabling prompt treatment before they spread. The size of these tumors often ranges from 2 to 3 cm but can grow larger, exceeding 5 cm. In advanced stages, Phyllodes tumors can cause visible blue coloration under the skin due to vein compression.

11. **Metastatic Breast Cancer:**

    It is often referred to as Stage 4 cancer, occurs when breast cancer cells have spread to major organs such as the liver, brain, lungs, kidneys, and more. It is highly invasive, as tumor cells destroy healthy tissues and spread through the lymph nodes and bloodstream to establish new growths in distant locations. Metastatic breast cancer is particularly aggressive and life-threatening, significantly reducing a person's life expectancy as it affects every cell and tissue in the body.

12. **Infiltrating Ductal Carcinoma:**

    Also known as Invasive Ductal Carcinoma, derives its name from its invasive nature. Tumor cells in this type of cancer infiltrate and penetrate surrounding cells and tissues, creating new tumor growths. Infiltrating Ductal Carcinoma originates in the milk ducts of the breast and rapidly spreads within and beyond the breast tissue.

13. **Molecular Subtypes of Breast Cancer:**

    Breast cancer can be categorized into five subtypes based on genetic information expressed in tumor cells:

- Luminal A
- Luminal B
- Triple Negative/Basal Like
- HER2 Type

CLASSIFICATION OF BREAST CANCER AS PER WHO

1. Non-invasive

a. Intraductal

b. Lobular carcinoma in situ

2. Invasive

a. Invasive ductal carcinoma

b. Invasive ductal carcinoma with a predominant intraductal component

c. Invasive lobular carcinoma

d. Mucinous carcinoma

e. Medullary carcinoma

f. Papillary carcinoma

g. Tubular carcinoma

h. Adenoid cystic carcinoma

i. Secretory (juvenile) carcinoma

j. Apocrine carcinoma

k. Carcinoma with metaplasia

i. Squamous type

ii. Spindle-cell type

iii. Cartilagenous and osseous type

iv. Mixed type

DIAGNOSIS OF BREAST CANCER:

A healthcare provider often diagnoses breast cancer through routine screenings or when an individual reports symptoms. Below, we outline tests and procedures that can help the healthcare provider form and confirm their diagnosis.

- **Breast Examination:**

This involves a thorough examination of the breasts to check for lumps or any potential signs of cancer. During the examination, the individual may be required to sit or stand with their arms in various positions, such as above their head or by their sides.

- **Imaging Tests:**

Various types of imaging tests can aid in the detection of breast cancer, including:

Mammogram: This is a specific type of X-ray commonly used in initial breast cancer screening. It generates images that can reveal lumps or abnormalities. However, if there is any indication of a potential issue, further testing is typically conducted.

Ultrasound: This procedure utilizes sound waves to help the healthcare provider distinguish between a solid mass and a fluid-filled cyst.

MRI (Magnetic Resonance Imaging): MRI combines multiple images of the breast to assist the healthcare provider in identifying cancer or other irregularities. A physician may recommend an MRI as a follow-up to a mammogram or ultrasound. MRIs are also utilized to screen individuals at a higher risk of developing breast cancer.

- **Biopsy[9]:**

A biopsy involves the extraction of a tissue sample, which is then sent to a laboratory for analysis. The results of the biopsy determine whether the cells are cancerous and, if so, the specific type of cancer that has developed. The results may also indicate whether the cancer is sensitive to hormones. Additionally, the healthcare provider stages the cancer to determine:

- The size of the tumor
- The extent of its spread
- Whether it is invasive
- This information provides crucial details about the prognosis and guides the appropriate treatment approach.

VARIOUS THERAPIES FOR BREAST CANCER[10-13]

Surgery may be necessary depending on the diagnosis and the individual's preferences. There are various types of surgical procedures, including:

Lumpectomy: This procedure involves the removal of the tumor along with a small portion of healthy tissue surrounding it. A lumpectomy can be effective in preventing the spread of cancer and is a viable option when the tumor is small and easily separable from the surrounding tissue.

Mastectomy: A mastectomy entails the removal of the breast's lobules, ducts, fatty tissue, nipple, areola, and some skin. In certain cases, the surgeon may also remove lymph nodesand chest wall muscle. There are different types of mastectomies, including simple mastectomy.

Sentinel Lymph Node Biopsy: When breast cancer reaches the sentinel lymph nodes, the first nodes to which it can potentially spread, it may further metastasize to other parts of the

body through the lymphatic system. However, if the healthcare provider does not detect cancer in the sentinel nodes, it is generally unnecessary to remove additional nodes.

Axillary Lymph Node Dissection: If cancer cells are found in the sentinel nodes, the healthcare provider may recommend the removal of several lymph nodes in the armpit. This procedure can help prevent the further spread of cancer.

Reconstruction: After a mastectomy, a surgeon can perform breast reconstruction to restore a more natural appearance to the breast. This can assist the individual in coping with the emotional effects of breast removal. Breast reconstruction can be performed either during the mastectomy or at a later date and may involve the use of breast implants or tissue from another part of the body.

- **Radiation therapy**

Following surgery, an individual may undergo radiation therapy approximately one month later. This treatment focuses on the tumor by delivering controlled doses of radiation to eliminate any remaining cancer cells.

- **Chemotherapy**

In cases where there is a high risk of recurrence or spreading, a healthcare provider may prescribe cytotoxic chemotherapy drugs to target and eliminate cancer cells. When chemotherapy is administered after surgery, it is referred to as adjuvant chemotherapy. Occasionally, a healthcare provider may recommend chemotherapy before surgery with the aim of reducing the size of the tumor and facilitating its removal. This is known as neoadjuvant chemotherapy.

- **Hormone-blocking therapy**

Healthcare providers utilize hormone-blocking therapy to prevent hormone-sensitive breast cancers from recurring after treatment. This therapy is effective in managing cancers that are responsive to estrogen receptors and progesterone receptors. It is typically administered following surgery, although it may also be prescribed before surgery to shrink the tumor.

For individuals who are not suitable candidates for surgery, chemotherapy, or radiotherapy, hormone-blocking therapy may serve as the primary treatment option. Examples of hormone-blocking medications may include:

- Tamoxifen (Nolvadex)
- Aromatase inhibitors

- Ovarian ablation or suppression
- Goserelin (Zoladex)

It's important to note that this type of treatment may have an impact on fertility.

- **3-D Mammography**

Also referred to as tomosynthesis or simply "tomo," captures X-ray images of breast tissue from multiple angles to create a digital three-dimensional image of the breast.

- **Excrescence Profiling**

Today, healthcare providers are also employing "growth profiling" techniques to identify specific genes within the tumor, aiding in the selection of the most appropriate treatment strategy. This approach is commonly used in cases of early-stage, hormone receptor-positive breast cancer. By examining the genetic profile of the tumor, healthcare providers can make predictions about the likelihood of cancer recurrence or metastasis and determine whether chemotherapy is advisable.

- **Immunotherapy**

Immunotherapy, which harnesses the body's immune system to target and eradicate tumours, has demonstrated significant potential in recent years for various cancer types, particularly melanoma and lung cancer. Historically, there was a belief among experts that breast cancer was "immunologically silent," meaning the body's immune system couldn't detect breast cancer cells. However, certain findings from clinical trials suggest that immunotherapy might have the potential to be effective against two less common but aggressive subtypes of breast cancer: HER2-positive and triple-negative breast cancer.

- **New Treatments for Metastatic Cancers**

In 2016, it was projected that approximately 40,000 women would succumb to metastatic breast cancer, which represents the most advanced stage of the disease (stage IV), where cancer cells have spread to other organs in the body. Although there is no cure for metastatic breast cancer, recent advancements in treatments have helped manage the cancer and enhancethe quality of life for those affected.

- **Biological treatment**

Targeted medications are designed to effectively combat specific forms of breast cancer. Some examples include:

- Trastuzumab (Herceptin)
- Lapatinib (Tykerb)

- Bevacizumab (Avastin)

It's important to note that treatments for breast cancer, as well as other types of cancer, can result in significant side effects. When deciding on a treatment plan, it's essential to discuss the potential risks with a healthcare provider and explore strategies to mitigate these side effects.

- **Nanomedicine- grounded strategies for targeting breast cancer and triadic-negative breast cancer**

Nanotechnology provides numerous avenues for imaging, monitoring, diagnosing, and delivering chemotherapy drugs to the tumor site. Nanoparticles assist in the more efficient delivery of drugs while minimizing toxicity, and they can overcome biological barriers, thereby improving anticancer effectiveness. Nanomedicine represents a fusion of expertise from materials science, pharmaceuticals, drug development, engineering, molecular biology, and information technology.

Nano- rectifiers targeting breast cancer stem cells (BCSCs)

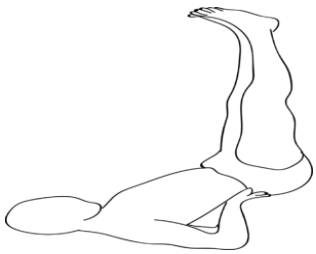
Nanomedicine holds significant promise in efficiently targeting and eradicating BCSCs, which play a crucial role in the initiation, progression, and resistance to chemo/radiotherapyin breast cancer (30). In comparison to single-agent therapies, combination chemotherapies involving cytotoxic agents have shown lower effectiveness. Nanomedicine incorporating chemotherapeutic agents can effectively suppress BCSCs by utilizing specific biomarkers such as CD44, CD133, CD90, and ALDH. It can also target various signaling pathways.

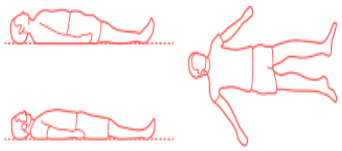
YOGA FOR BREAST CANCER [14]

Research indicates that individuals with breast cancer who practice yoga may experience reduced stress, an improved quality of life, and decreased fatigue. However, those who have undergone breast cancer surgery, such as a mastectomy, may encounter arm and shoulder issues that specific yoga poses could potentially worsen. A knowledgeable yoga instructor can make adjustments to poses to accommodate an individual's specific needs. Yoga offers various advantages for individuals dealing with breast cancer, including:

- Alleviating fatigue
- Enhancing overall quality of life
- Reducing nausea symptoms
- Promoting relaxation

Table no.2: Different poses (Asanas) and their benefits in the management of Breast Cancer

Sr. no.	Pose(Asana)	Importance
1	Balasana 	Balasana, commonly known as Child's Pose, assists in stretching the hips, thighs, and muscles of the back while providing a relaxing effect on the chest muscles.
2	Dirga Pranayama 	Dirga Pranayama, also known as Three-Part Breath, promotes deep, complete breathing, enhancing oxygen delivery to the blood and alleviating muscle tension. It is also effective in reducing stress and fostering mindfulness within the body.
3	ViparitaKarani 	Commonly referred to as Legs Up the Wall Pose, Viparita Karani relieves tension in the neck and spine while promoting a sense of rotation and relaxation.
4	Uttanasana 	This posture, alternatively referred to as Standing Forward Bend, elongates the shins, hamstrings, and hips, easing tension in the neck, spine, and muscles of the back.
5	Savasana	Savasana, also known as Corpse Pose, aids in soothing the mind and alleviating sensations of stress.

PREVENTION OF BREAST CANCER:

Preventing breast cancer entirely may not be possible, but individuals can adopt various measures to substantially lower their risk. These include:

- Limiting alcohol intake, especially for those who consume alcohol.
- Maintaining a healthy diet rich in fresh fruits and vegetables.
- Engaging in regular physical activity.
- Maintaining a healthy body mass index (BMI).

Individuals considering hormone replacement therapy after menopause should discuss this option with a healthcare professional. Additionally, for individuals at a high risk of breast cancer, preventative surgery is also a viable consideration.

NUTRITION FOR BREAST CANCER [15-16]

- **Fruits and Vegetables**

The extensive consumption of fruits and vegetables in the Mediterranean diet provides significant quantities of both polyphenols and fiber, both of which have shown potential in countering the development of cancer.

One implicit mechanism of action for polyphenols is their ability to counteract oxidative stress and inflammation. For example, polyphenols found in blueberry extract can regulate the growth and metastatic activity of breast cancer by inhibiting interleukin (IL)-6. Additionally, polyphenols can inhibit the enzymatic activity of lipoxygenase (LOX) and cyclooxygenase (COX), as well as the activity of the transcription factor NF-B. These proteins are often over expressed in tumor cells and play a critical role in regulating the expression of inflammatory cytokines, such as tumor necrosis factor and IL-1. Lastly, certain polyphenols have been discovered to interfere with estrogen signaling, either by inhibiting aromatase, the enzyme responsible for estrogen synthesis, or by binding to the estrogen receptor (ER). [17, 18]

Consequently, this helps in controlling the buildup of tumor cells. In a similar manner, fiber may assist in countering the development of cancer by capturing estrogens, reducing their

levels in the bloodstream, or by improving insulin sensitivity and reducing the likelihood of weight gain.

- **Red Meat**

Red and processed meats are considered risk factors for breast cancer due to their high iron content, the presence of estrogen-related compounds in livestock, or the formation of mutagens during cooking.

A recent extensive meta-analysis that encompassed 17 prospective studies examined the link between the consumption of red and processed meats and the risk of breast cancer. The findings revealed that unprocessed red meat consumption was linked to a 6% increased risk of breast cancer, while the consumption of processed meats was associated with a 9% elevated risk of breast cancer.

- **Dairy Products**

They contain a combination of elements, including saturated fats, calcium, vitamin D, butyrate, lactoferrin, and associated linoleic acid, which could potentially have contrasting effects on the risk of breast cancer. However, epidemiological studies have yielded conflicting findings, reporting both inverse and positive associations between dairy product consumption and breast cancer risk.

Carbohydrate and Glycaemic Index

The available information regarding the connection between the intake of overall carbohydrates or specific carbohydrate types (such as total sugars or individual sugars), glycemic index (GI), glycemic load (GL), and the risk of breast cancer is conflicting and lacks a clear consensus.

In particular, GI pertains to the post-meal glucose response triggered by a standardized amount of 50 grams of carbohydrates from various food sources. GL, on the other hand, isthe result of multiplying GI by the total quantity of available carbohydrates in a specific portion of food. Consequently, GL serves as a more robust predictor of post-meal blood sugarlevels and insulin response compared to GI.

- **Soy Products and Isoflavones**

They serve as a beneficial reservoir of isoflavones, compounds that exhibit mild estrogen-like properties due to their chemical structure similarity to naturally occurring human estrogens. These isoflavones, namely genistein, daidzein, and glycitein, are naturally found in soybeans and are present in most soy-based products. They collectively constitute approximately 50-55%, 40-45%, and 5-10% of the total isoflavone content, respectively.

NUTRITIONAL INTERVENTIONS DURING BREAST CANCER TREATMENT [17, 18]

Changes in taste experienced during breast cancer treatment primarily stem from damage to taste receptor cells (TRCs) located on the lingual epithelium and throughout the digestive tract caused by radiation therapy or chemotherapeutic agents. Additionally, xerostomia (dry mouth) has been linked to alterations in taste, as radiation therapy consistently affects saliva volume and composition by harming salivary glands. During chemotherapy, women often report modified preferences for macronutrients, leading to a significant reduction in protein and fat intake.

A suitable nutritional approach can help individuals adopt effective strategies to enhance the palatability of their food. For instance, incorporating synthetic flavors, consuming smaller and more frequent meals, using additional seasonings, adding a touch of sweetness to dishes, opting for more steamed foods, enjoying a snack before meals, sipping on sweet beverages, utilizing plastic utensils, drinking through a straw, or using non-metal cookware and utensils can assist in mitigating the metallic taste often associated with meat. Lemon juice and mint can also make meals more enjoyable. Moreover, individuals should maintain good oral hygiene by brushing their teeth and tongue before eating and consider using baking soda or antibacterial mouthwash, as these measures may also help alleviate taste changes.

NUTRITIONAL SUPPLEMENT OF BREAST CANCER [19]

- ***Echinacea***

Echinacea, a member of the *Asteraceae* family, boasts a lengthy history of medicinal usage. It is native to eastern and central North America and is also cultivated in Europe. There are three distinct species of Echinacea that are employed for phytotherapeutic purposes: *Echinacea purpurea*, *Echinacea angustifolia*, and *Echinacea pallida*.

The utilization of Echinacea as an anticancer agent is based on its abundant content of flavonoids, which serve as a catalyst by enhancing the activity of lymphocytes. This, in turn, enhances phagocytosis and the function of natural killer cells, ultimately promoting the production of interferon.

Allium sativum

Allium sativum, commonly referred to as garlic, possesses various biologically active secondary metabolites rich in sulfur compounds, such as S-allyl cysteine, diallyl disulfide, diallyl trisulfide, and methyl allyl trisulfide. Additionally, garlic contains other beneficial compounds such as arginine, oligosaccharides, flavonoids, and selenium, which act as

cellular antioxidants. The primary active components in garlic, the organic sulfur compounds, have garnered significant attention for their potential as preventive and therapeutic agents in breast cancer.

Linumusitatissimum.

Linum usitatissimum, commonly known as flaxseed, is recognized for its high phytoestrogen lignan content, specifically secoisolariciresinol diglucoside. These compounds are transformed into mammalian lignans, namely enterolactone and enterodiol, through bacterial activity in the colon. This bacterial conversion plays a beneficial role in enhancing the anti- cancer properties of flaxseed. Due to their structural resemblance to estrogens, these mammalian lignan metabolites can bind to estrogen receptors and effectively hinder the growth of estrogen-driven breast cancer.

CONCLUSION

Breast cancer has remained a prominent and ongoing health concern for women. It is a condition that profoundly impacts individuals, families, and communities, exacting a significant toll both financially and spiritually. This form of cancer develops within the breast tissues, including the ducts (tiny tubes that transport milk) and the lobules (milk-producing glands). It's worth noting that breast cancer is not limited to any specific gender, although it is less common in men. While the precise cause of breast cancer remains elusive, certain risk factors have been identified. These risk factors vary among different types of cancer. Some, such as smoking, alcohol consumption, and dietary choices, can be modified through lifestyle changes. However, others, including age, race, gender, and family history, are inherent and unchangeable. Having one or more of these risk factors does not guarantee the development of breast cancer. Although many of these factors increase the likelihood of breast cancer occurrence and progression, the exact mechanisms remain unclear. Hormones are believed to play a significant role in certain types of breast cancer, though the exact processes of development and progression are not fully understood. In summary, factors such as aging, a family history of breast cancer, specific genetic mutations, reproductive history, menopausal status, physical inactivity, alcohol consumption, dietary habits, racial background, and exposure to radiation are recognized risk factors for breast cancer. This condition impacts various aspects of women's lives, affecting their physical, emotional, and social well-being. However, strong social and family support during the illness can mitigate its negative effects.

REFERENCES:

1. Harbeck N, Penault-Llorca F, Cortes J, Gnant M, Houssami N, Poortmans P, Ruddy K, Tsang J, Cardoso F. Breast cancer. Nat Rev Dis Primers. 2019:5(1);66.
2. Torre LA, Sauer AM, Chen MS, Kagawa-Singer M, Jemal A, Siegel RL. Cancer statistics for Asian Americans, native hawaiians, and pacifc islanders: converging incidence in males and females. Cancer J Clin. 2016; 66:182–202.
3. Brayboy L, Oulhen N, Long S, Voigt N, Raker C, Wessel G. Multidrug resistance transporter-1 and breast cancer resistance protein protect against ovarian toxicity, and are essential in ovarian physiology. Rep Toxicol. 2017; 69:121–31.
4. Stark G, Grandel S, Spilker G. Tissue suction of the male and female breast. AesthPlast Surg. 1992;16:317–324
5. Thomsen S, Tatman D. Physiological and pathological factors of human breast disease that can infuence optical diagnosis. Ann N Y Acad Sci. 1998; 838(1):171– 93.
6. Ginsburg O, Yip CH, Brooks A, et al, Breast cancer early detection: A phased approach to implementation. Cancer. *American Cancer Society*. 2020; 126:2379– 2393.
7. Chen, F.P.; Chien, M.H. Phytoestrogens induce differential effects on both normal and malignant human breast cells in vitro. Climacteric 2014;17:682–691.
8. Jagannathan N, Sharma U. Breast tissue metabolism by magnetic resonance spectroscopy. Metabolites. 2017;7:25–30
9. Tanis P, Nieweg O, Olmos R, Kroon B. Anatomy and physiology of lymphatic drainage of the breast from the perspective of sentinel node biopsy. J AmerColl Surg. 2001;192:399–409.
10. Basu P, Zhang L, Hariprasad R, Carvalho AL, Barchuk A. A pragmatic approach to tackle the rising burden of breast cancer through prevention & early detection in countries 'in transition'. *Indian J Med Res*. 2020; 152:343–355.
11. Mehrotra R, Yadav K. Breast cancer in India: Present scenario and the challenges ahead. *World J ClinOncol* 2022; 13(3): 209-218
12. Chaturvedi M, Vaitheeswaran K, Satishkumar K, Das P, Stephen S, Nandakumar A. Time trends in breast cancer among Indian women population: an analysis of population based cancer registry data. *Indian J Surg Oncol*. 2015;6(4):427–434.
13. Dhillon PK, Mathur P, Nandakumar A. The burden of cancers and their variations across the states of India: the Global Burden of Disease Study 1990–2016. *Lancet Oncol*. 2018;19(10):1289–1306

14. Geng C. Yoga: Benefits for breast cancer, and poses [Internet]. 2021. Available from: https://www.medicalnewstoday.com/articles/yoga-for-breast-cancer
15. Mohd Fadzelly Abu Bakar ,AzisSaifudin , Peng Cao , Norhaizan MohdEsa ,Hindawi Herbal Medicine for Prevention and Therapy in Breast Cancer , Evidence-Based Complementary and Alternative Medicine;2021:1- 4
16. Third Expert Report on "Diet, Nutrition, Physical Activity and Cancer: A Global Perspective". World Cancer Research Fund Available online: https://www.wcrf.org/dietandcancer/breast-cancer (accessed on 27 September 2018).
17. Maskarinec, G.; Morimoto, Y.; Takata, Y.; Murphy, S.P.; Stanczyk, F.Z. Alcohol and dietary fibre intakes affect circulating sex hormones among premenopausal women. Public Health Nutr. 2006;9:875–881.
18. Paola De Cicco, Maria Valeria Catani, Valeria Gasperi , Matteo Sibilano , Maria Quaglietta Isabella Savini, Nutrition and Breast Cancer: A Literature Review on Prevention, Treatment and Recurrence Nutrients .2019 ;11:1514
19. R. E. Rossi, M. Pericleous, D. Mandair, T. Whyand, and M. E. Caplin, The role of dietary factors in prevention and progression of breast cancer, Anticancer Research, 2014;34(12):6861–6875.
20. S. E. Edwards, I. C. Rocha, E. M. Williamson, and M. Heinrich, Phytopharmacy: An Evidence-Based Guide to Herbal Medicinal Products, John Wiley & Sons, 2015.
21. Inoue-Choi, M.; Sinha, R.; Gierach, G.L.; Ward, M.H. Red and processed meat, nitrite, and heme iron intakes and post-menopausal breast cancer risk in the NIH- AARP Diet and Health Study. Int. J. Cancer 2016;138: 1609–1618.
22. Hassiotou F, Geddes D. Anatomy of the human mammary gland: current status of knowledge. Clin Anat. 2013;26:29–48
23. Kontou, N. The Mediterranean Diet in Cancer Prevention. In The Mediterranean Diet; Preedy, V.R., Watson, R.R., Eds.; Academic Press: San Diego, CA, USA, 2015;36;393–406.
24. Braakhuis, A.J.; Campion, P.; Bishop, K.S. Reducing breast cancer recurrence: The role of dietary polyphenolics. Nutrients 2016; 8:547.
25. Kanaya, N.; Adams, L.; Takasaki, A.; Chen, S. Whole blueberry powder inhibits metastasis of triple negative breast cancer in a xenograft mouse model through modulation of inflammatory cytokines. Nutr. Cancer 2014;66:242–248.

26. Wadsworth, T.L.; Koop, D.R. Effects of the wine polyphenolicsquercetin and resveratrol on pro-inflammatory cytokine expression in RAW 264.7 macrophages. Biochem. Pharm. 1999;57:941–949.
27. Gerhäuser, C.; Klimo, K.; Heiss, E.; Neumann, I.; Gamal-Eldeen, A.; Knauft, J.; Liu, G.Y.; Sitthimonchai, S.; Frank, N. Mechanism-based in vitro screening of potential cancer chemopreventive agents. Mutat. Res. 2003;523:163–172.
28. Biswas, S.K, McClure, D, Jimenez, L.A., Megson, I.L., Rahman, I. Curcumin induces glutathione biosynthesis and inhibits NF-kappaB activation and interleukin-8release in alveolar epithelial cells: Mechanism of free radical scavenging activity. Antioxid. Redox Signal. 2005;7:32–41.
29. Dannenberg, A.J.; Subbaramaiah, K. Targeting cyclooxygenase-2 in human neoplasia: Rationale and promise. Cancer Cell 2003; 4:431–436.
30. Brueggemeier, R.W.; Díaz-Cruz, E.S.; Li, P.K.; Sugimoto, Y.; Lin, Y.C.; Shapiro, C.L. Translational studies on aromatase.; cyclooxygenases.; and enzyme inhibitors in breast cancer. J. Steroid Biochem. Mol. Biol. 2005:95; 129–136.
31. Prentice, R.L.; Caan, B.; Chlebowski, R.T.; Patterson, R.; Kuller, L.H.; Ockene, J.K.; Margolis, K.L.; Limacher, M.C.; Manson, J.E.; Parker, L.M.; et al. Low fat dietary pattern and risk of invasive breast cancer. The Women's Health Initiative randomized controlled dietary modification trial. JAMA 2006:295; 629–642.
32. Turner, L.B. A meta-analysis of fat intake, reproduction, and breast cancer risk: An evolutionary perspective. Am. J. Hum. Biol. 2011:23;601–608.
33. Holmes, M.D.; Liu, S.; Hankinson, S.E.; Colditz, G.A.; Hunter, D.J.; Willett, W. Dietary carbohydrates, fiber, and breast cancer risk. C Am. J. Epidemiol. 2004: 159;732–739.
34. De Vries, Y.C.; van den Berg, M.M.G.A.; de Vries, J.H.M.; Boesveldt, S.; de Kruif, J.T.C.M.; Buist, N.; Haringhuizen, A.; Los, M.; Sommeijer, D.W.; Timmer-Bonte, J.H.N.; et al. Differences in dietary intake during chemotherapy in breast cancer patients compared to women without cancer. Support. Care Cancer 2017:25;2581–2591
35. B. Mukherjee, N. Telang, and G. Y. C.Wong, Growth inhibition of estrogen receptor positive human breast cancer cells by Taheebo from the inner bark of Tabebuiaavellandae tree, International Journal of Molecular Medicine, 2009.24(2), 253–260.

36. J. J. Pink, S. Wuerzberger-Davis, C. Tagliarino et al.,Activation of a cysteine protease in MCF-7 and T47D breast cancer cells during β-lapachone-mediated apoptosis, Experimental Cell Research, 2000:255 (2) 144–155.
37. S. Alam, D. Katiyar, R. Goel, A. Vats, and A. Mittal, Role of herbals in cancer management, The Journal of Phytopharmacology. 2013; 2:46–51.
38. J. A. Milner. Garlic: its anticarcinogenic and antitumorigenic properties. Nutrition Reviews, 1996 ; 54(11):82–86.
39. L.U.Thompson, P.Robb, M.Serraino, and F. Cheung. Mammalian Lignan Production From Various Foods. Nutrition and Cancer1991;16(1):43–52
40. H. B. Mabrok, R. Klopfleisch, K. Z. Ghanem, T. Clavel, M. Blaut, and G. Loh, Lignan transformation by gut bacteria lowers tumor burden in a genotobiotic rat model of breast cancer, Carcinogenesis, 2012;33(1):203–208
41. Wadasadawala T, Sen S, Watekar R, Rane P, Sarin R, Gupta S, Parmar V, Kannan S, Mohanty SK. Economic Distress of Breast Cancer Patients Seeking Treatment at a Tertiary Cancer Center in Mumbai during COVID-19 Pandemic: A Cohort Study. Asian Pac J Cancer Prev. 2021;**22**:793–800.
42. Aksenova IA, Moore MA, Domozhirova AS. Trends in breast cancer epidemiology in Chelyabinsk Region, 2006–2015. *Asian Pac J Cancer Prev*. 2017; 18(4):1163–1168.
43. Newman T. What is a mastectomy? [Internet]. 2021. Available from: https://www.medicalnewstoday.com/articles/302035
44. Fletcher J. What to know about breast reconstruction surgery [Internet]. 2019. Available from: https://www.medicalnewstoday.com/articles/319215
45. Goodman E. What to know about radiation therapy [Internet]. 2021. Available from: https://www.medicalnewstoday.com/articles/types-of-radiation-therapy