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PROMISING PLANTS WHICH EFFECTIVELY WORK TO PREVENT BREAST CANCER

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ABSTRACT

Breast cancer is the second largest cause of cancer death among women.One of the most effective ways to avoid breast cancer is to detect it early.Breast cancer classification has been proposed by using gene expression profiles from cancer patient.Luminal,basal-like,normal-like and erbB2+subgroups where found and demonstrated to have varied prognoses.The objectives of the treatment include symptom relief,delayin the on set of the disease,and extending total survival time with out impairing quality of life.Different varitiess of herbs include a wide range ofactive phytochemicals including carotenoids, flavonoids, ligans, polyphenolics, terpenoids, sulifides and plant sterols. Complementery and alternative medicine(CAM)utilized in treatment related symptom control and reduction of side effects is increasingly being shown in the literature to play a significant role in improving quality of life and survival rates for people with breast cancer the enhanced molecular teting that will aid in early detection and improved survival is highlited by the heterogenicity of the breast cancer.Artificial intelligence and liquid biopsy,to emerging fields would help to under stand the complexicity of the breast cancer disease and determine the therapeutic regimen that aids in the management of breast cancer.

KEYWORDS: Breast cancer, CAM, Phytochemicals, liquid biopsy, therapeutic regimen.

INTRODUCTION

Breast cancer is the leading cause of mortality among women worldwide. Its many diverse sub kinds, which vary in their pathological characteristics and clinical relevance, are compressed into one heterogeneous disease. distinctive therapeutic strategies are needed for these diverse subgroups since they have distinctive histopathological and biological traits and respond to treatment differently. The classification of breast cancer into various subtypes is therefore essential for therapeutic decision-making and individualized treatment. Breast cancer can be classified into five intrinsic subgroups, including Luminal A, Luminal B, HER2-overexpressed, basal, and normal-appearing tumors. The two primary biological processes, proliferation/cell cycle and Luminal/hormone-regulated pathways, are known to be expressed by the Luminal A and Luminal B subtypes, which primarily separate them from other subtypes.

Similar to the basal-like subtype, the HER2 enriched subtype is defined by the overexpression of HER2-related and proliferation-related genes and proteins. 9.6 million people died from cancer in 2018, while 18.1 million new instances of the disease were identified. A further estimate put the global five-year prevalence at 43.8 million.

Cancer, which is the second most common cause of death and a genetic disease, develops when abnormal cells in the body proliferate out of control and spread to other body areas.

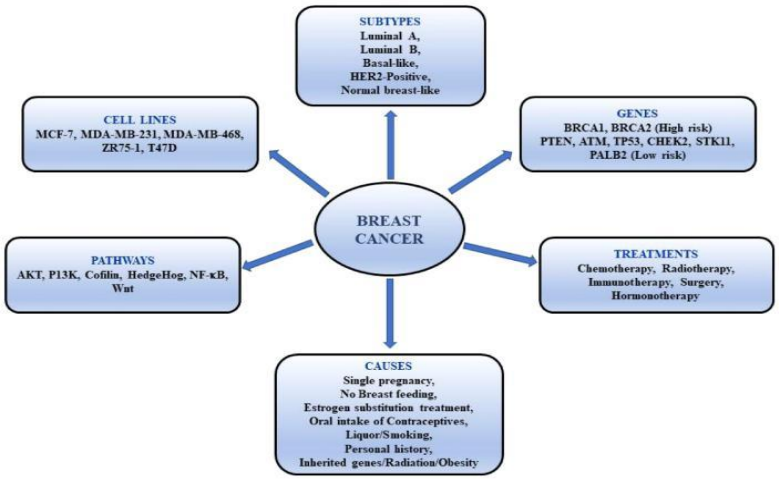


FIG-1

STRATEGIES OF BREAST CANCER

The methods used to treat breast cancer patients are constantly changing.

The decision-making process for each individual patient is influenced by a variety of factors, including genetic predisposition, disease load, tumor markets, receptor status, and patient preference.

The targeted elimination of cancer cells with little or no non-specific detrimental effects on healthy cells continues to be the largest difficulty in the treatment of breast cancer.

A promising therapeutic method to eradicate tumor cells with high specificity and efficiency is adoptive T cell therapy, which involves the transfer of genetically modified T lymphocytes that specifically recognize and kill tumor cells expressing a particular molecules and vaccines.

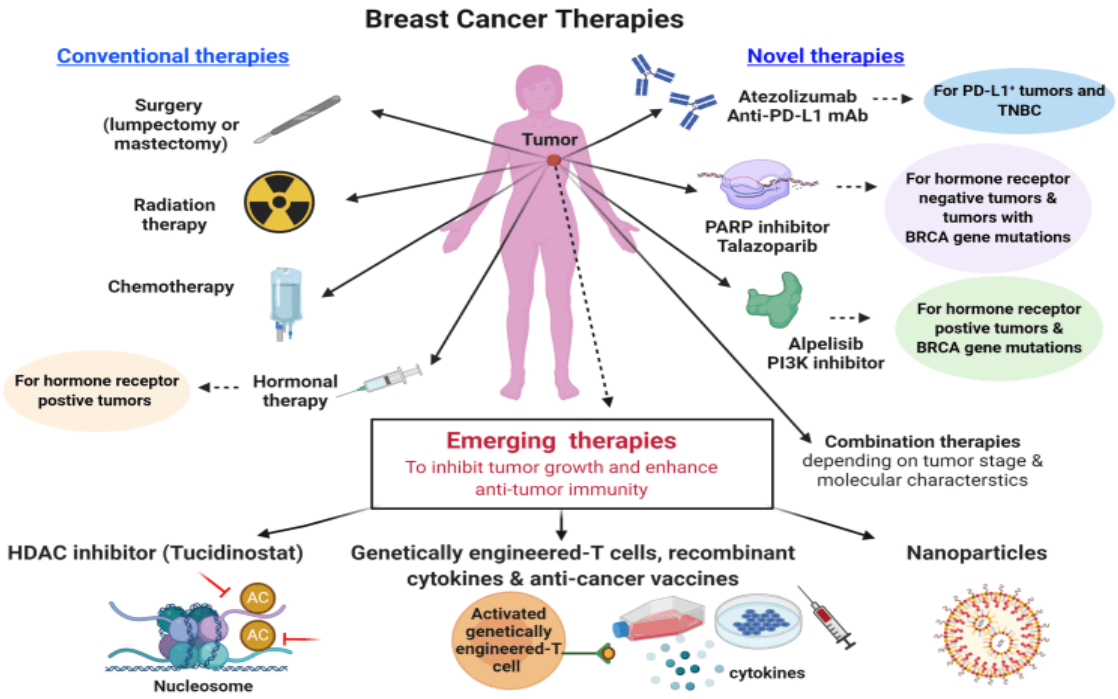


Figure 2 Currently available breast cancer therapies and proposed therapeutic strategies to improve clinical outcomes in patients who do not benefit from conventional therapies. TNBC, triple negative breast cancer; BRCA, BReast CAncer gene; PARP, poly (ADP-ribose) polymerase; PI3K, phosphatidylinositol 3-kinase;PD-L1,programmed cell death-ligand1; HDAC, HistoneDeacetylase.

Post neoadjuvant treatment statergies for patient with breast cancer

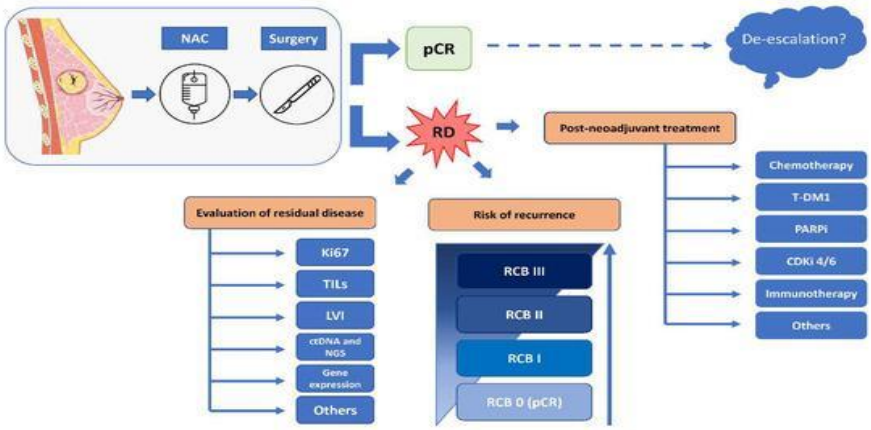


Figure 3: Simplified illustration of a breast cancer patient's post-neoadjuvant therapy regimen.

Patients who are candidates for preoperative treatment are given neoadjuvant chemotherapy. If the tumor is no longer evident in the material at the time of surgery (i.e., a pathological complete response (pCR) is obtained), these patients may be candidates for de-escalation therapy options, as pCR is associated with a lower chance of disease recurrence. Surgery, radiation, or systemic adjuvant therapy are all possible de-escalation strategies. It should be noted that the therapy of a patient with a pCR is complex and necessitates interdisciplinary discussion. Indeed, care should be taken to prevent removing too many treatment components.

PATHOPHYSIOLOGY OF BREAST CANCER

Breast cancer is a malignant tumor that develops from breast cells.

The chance of developing breast cancer can be increased by a number of variables, just like other malignancies.
The effects of estrogen exposure on DNA damage and genetic changes that can cause breast cancer have been experimentally linked.

Some people inherit genetic abnormalities, including those related to the BRCA1, BRCA2, and P53 genes, among others.

Therefore, those who have a family history of ovarian or breast cancer are more likely to get breast cancer.

Normally, the immune system searches for and kills cancerous cells as well as cells with DNA damage.

Failure of such a strong immune response and surveillance could lead to breast cancer.

There are a number of growth factor and other mediator signaling systems that interact between strong cells and epithelial cells; destroying these systems may also result in breast cancer.

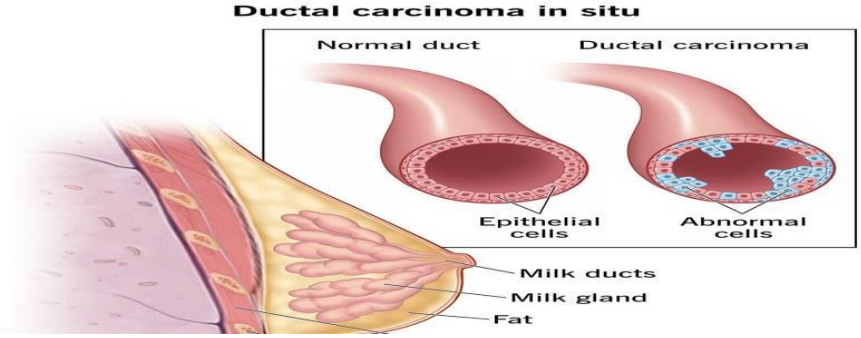
Adenocarcinomas, the most common kind of breast cancer, initially develop from the ductal/lobular epithelium as carcinoma in situ.

Carcinoma in situ is a form of early-stage, noninvasive epithelial cell growth that the basement membrane confines to the ducts and lobules.

Ductal carcinoma in situ (DCIS) makes up around 84% of all in situ illness, with lobular carcinoma in situ (LCIS) making up the majority of the remaining cases.

DCIS stands for ductal carcinoma in situ, a diverse group of proliferative lesions that are confined to ducts and lobules without spreading to the basement membrane.

DCIS can affect men as well as women, however it usually affects women. A wide range of invasive tumors are at risk with DCIS.



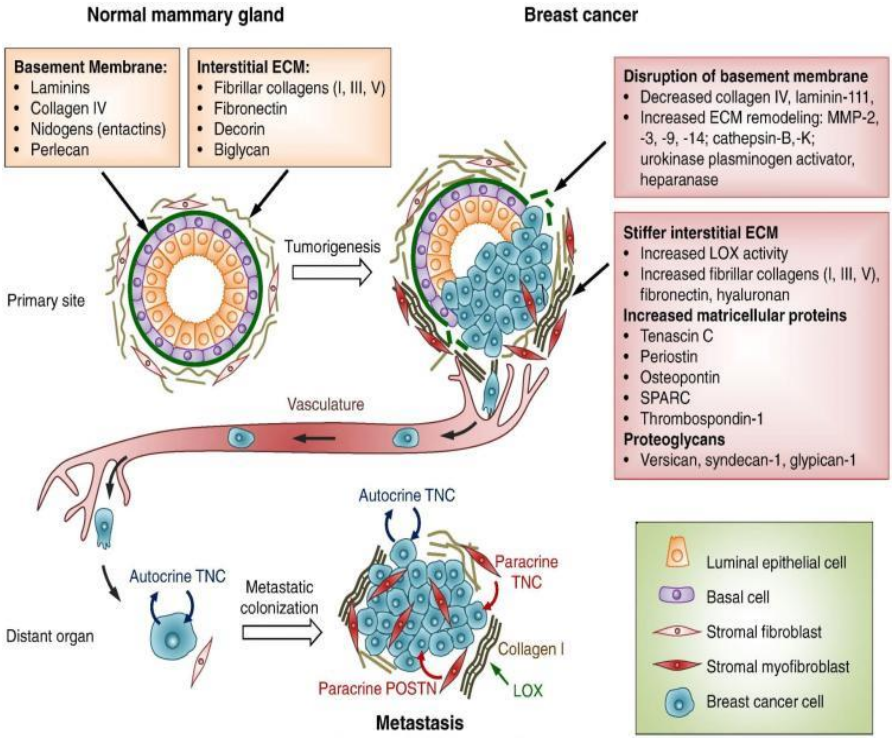


FIGURE 4 Extracellular matrix (ECM) alterations in the development and metastasis of breast cancer. Breast cancer dramatically alters the main elements of the ECM in the normal mammary gland. Due to the increased creation of fibrous ECM by activated fibroblasts and cancer cells, a desmoplastic response is linked to the development of breast cancer. enhanced fibronectin and other ECM component production, along with enhanced collagen deposition and lysyl oxidase (LOX) enzyme crosslinking, harden the ECM, which in turn encourages tumor aggressiveness.

ECM remodeling enzymes like MMPs, heparanase, and others degrade the basement membrane encircling the mammary gland epithelium. Additionally, there is an upregulation of matricellular proteins such tenascin C, periostin, osteopontin, SPARC, and thrombospondin-1 that support cancer cell fitness. Breast cancer cells from the main tumor, including those with the capacity to form metastatic colonies, enter the bloodstream, spread, and have the capacity to reach remote areas.

COMPLICATIONS OF BREAST CANCER

One researcher investigated the side effects of breast-conserving therapy, including surgery, post-operative radiation, and adjuvant chemotherapy for node-positive patients, by evaluating a standardized patient questionnaire.

Lymphedema (LE) of the arm was the most prevalent and worst single consequence.

Arm function deficit in general was frequently noted (65.6%). 3.6% of people had significantly limited shoulder mobility (arm abduction of less than or equal to 90 degrees).

Metastasis is the most dangerous side effect of breast cancer.

This occurs when certain tumor cells separate and travel to different parts of the body via the blood or lymphatic channels, infecting the tissue at fresh, potentially remote regions.

The lymph nodes, lungs, liver, bones, brain, and skin are where breast cancer cells spread most frequently.

Before cancer that has spread from the initial tumor manifests, it may take years, even after the breast tumor is identified and treated.

ADVERSE EFFECT OF AVAILABLE DRUGS

NERVE DAMAGENEUROPATHY: A number of **ADJUVANT BREAST CANCER**: Headache, diarrhea, nausea, and chills are the most frequent side responses (>5%).

METASTATIC BREAST CANCER: The most frequent side responses (>10%) for metastatic breast cancer are fever, chills, headache, infections, congestive heart failure, insomia and cough, and rashes.

METASTATIC GASTRIC CANCER: Headache, diarrhea, nausea, and chills are the most frequent side responses (>10%).

MENSTRUAL CHANGES AND FERTILITY PROBLEMS: For younger women, alterations in

menstrual cycles are a frequent adverse effect of chemotherapy. Infertility (not being able to get pregnant) and premature menopause (having no more menstrual periods) may happen and could last a lifetime. Heart disease, bone loss, and osteoporosis are all at higher risk if this occurs. Medicines exist that can treat or aid in preventing bone loss.

HEART DAMAGE: Although it is uncommon, chemotherapy medications like doxorubicin, epirubicin, and some others can permanently damage the heart (a condition known as cardiomyopathy). If the medicine is taken frequently or in high quantities, the danger is greatest. Additionally, if additional heart-harming medications are used (such as those that target HER2), damage from these medications occurs more frequently.You may also be at risk if you take one of these medications if you have other heart failure risk factors, such as high blood pressure, diabetes, or a family history of heart diseases.

NERVE DAMAGE (NEUROPATHY): breast cancer medications, such as vinorelbine, eribulin, and ixabepilone, can harm the nerves in the hands, arms, feet, and legs. These medications include taxanes (docetaxel, paclitaxel, and protein-bound paclitaxel), platinum agents (carboplatin, cisplatin), and taxanes. Numbness, discomfort, burning or tingling sensations, sensitivity to cold or heat, or weakness may occasionally result from this. When therapy is stopped, these symptoms typically go away, but in some women, they may persist for a long period or even become permanent. These symptoms may be alleviated by medications.

Long-term side effects

Long-term negative effects might last for months or even years after the completion of treatment.

Long-term negative impacts may consist of

BREAST CHANGES: Radiation treatment may cause the breasts to shrink or grow denser. Breastfeeding issues have been reported by some mothers (Trusted Source).

BRANCHIAL PLEXOPATHY: Radiation to the breast or chest wall can occasionally harm the nerves that run through the arm, wrist, and hand, a condition known as brachial plexopathy.

In the affected location, nerve injury may result in numbness, discomfort, or weakness.

LYMPHEDEMA: Arm, hand, or chest swelling is known as lymphedema. There may be an accumulation of lymph fluid when radiation damages surrounding lymph nodes.

ADVANTAGES OF HERBS/METABOLITS

FIGURE 5:

LIST OF HERBS FOR BREAST CANCER

The (curcuma longa plant) Turmeric contains a substance called curcumin, which has anticancer effects.

The antioxidant and anti-inflammatory effects of curcumin are strengthened by the body (Arctium lappa) burdock Burdock is a common ingredient in herbal treatments for measles, tonsillitis, and arthritis. Its root has a sweet flavor and gummy texture.

Researchers have discovered that burdock has some active components that modify oncogenes to produce anticancer effects.

Camellia sinensis green tea A substance found in green tea called polyphenol has anticancer, antimutagenic, and antioxidant properties.

Black cohosh is a type of shrub. Patients with breast cancer who are receiving chemotherapy and radiation take black cohosh.

Flaxseed Small, hard-coated, brown and golden seeds are produced by the flax plant. These seeds include beneficial substances such lignans, fiber, and omega 3.

When compared to soy products, flaxseed has more strong phytoestrogens, and eating flaxseed significantly alters how much hydroxyestrone is eliminated.

LIST OF HERBS FOR BREAST CANCER

Botanical name Family	Part used	Preparation method	Administration	Use reports (%)
Berberis vulgaris L. Berberidaceae	Roots	Raw	Oral	13 (27.6%)
Aristolochia longa L. Aristolochiaceae	Roots	Raw	Oral	15 (31.9%)
Prunus persica (L.) Batsch Rosaceae	Leaves	Raw	Oral	2 (04.2%)
Atriplex halimus Chenopodiaceae	Seeds	Decoction	Oral	7 (14.9%)
Glycyrrhiza glabra L. Papilionaceae/ Fabaceae	Roots	Infusion	Oral	1 (02.1%)
Nigella sativa L. Ranunculaceae	seeds	Paste	Oral	4 (08.5%)
Pimpinella anisum L. Apiaceae	seeds	Infusion	Oral	2 (04.2%)
Allium sativum L. Liliaceae	Bulb	Raw	Oral	1 (02.1%)
Thymus vulgaris L. Lamiaceae	Aerial parts	Infusion	Oral	1 (02.1%)
Artemisia herba-alba L. Asteraceae	Aerial parts	Decoction	Oral	1 (02.1%)

FIGURE 6

ADVANTAGES

The components of natural plant products like flavonoids, alkaloids, terpenoids, and coumarins are known for their lymphocyte activation (quinic acid, -carotene, epigallocatechin-3-gallate, and ginsan), which is a powerful immunomodulatory property required to suppress, or fight against, cancer cells.

They also have anti-inflammatory and antioxidant properties (glabridin, curcumin, arctigenin, and ajoene).

With the aid of contemporary bimolecular science, which recognizes several significant properties, such as anticancer, anti-inflammatory, and anti-virus, we may better understand the impacts or actions of herbs on various targets.

As the effects of such herbal medicine are becoming better understood, their effectiveness in treating various malignancies has also been established. For instance, hepatocellular carcinomas (HCC) are the fifth most prevalent cancer in the world, and their frequency is rising.

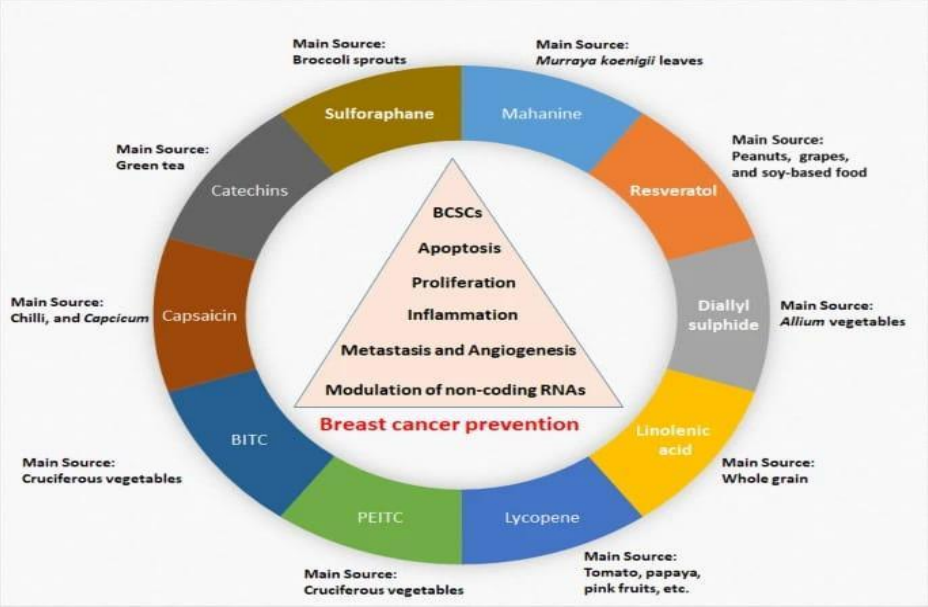


FIGURE 7

LIST OF PROMISING PLANT METABOLITES AVAILABLE IN INDIA

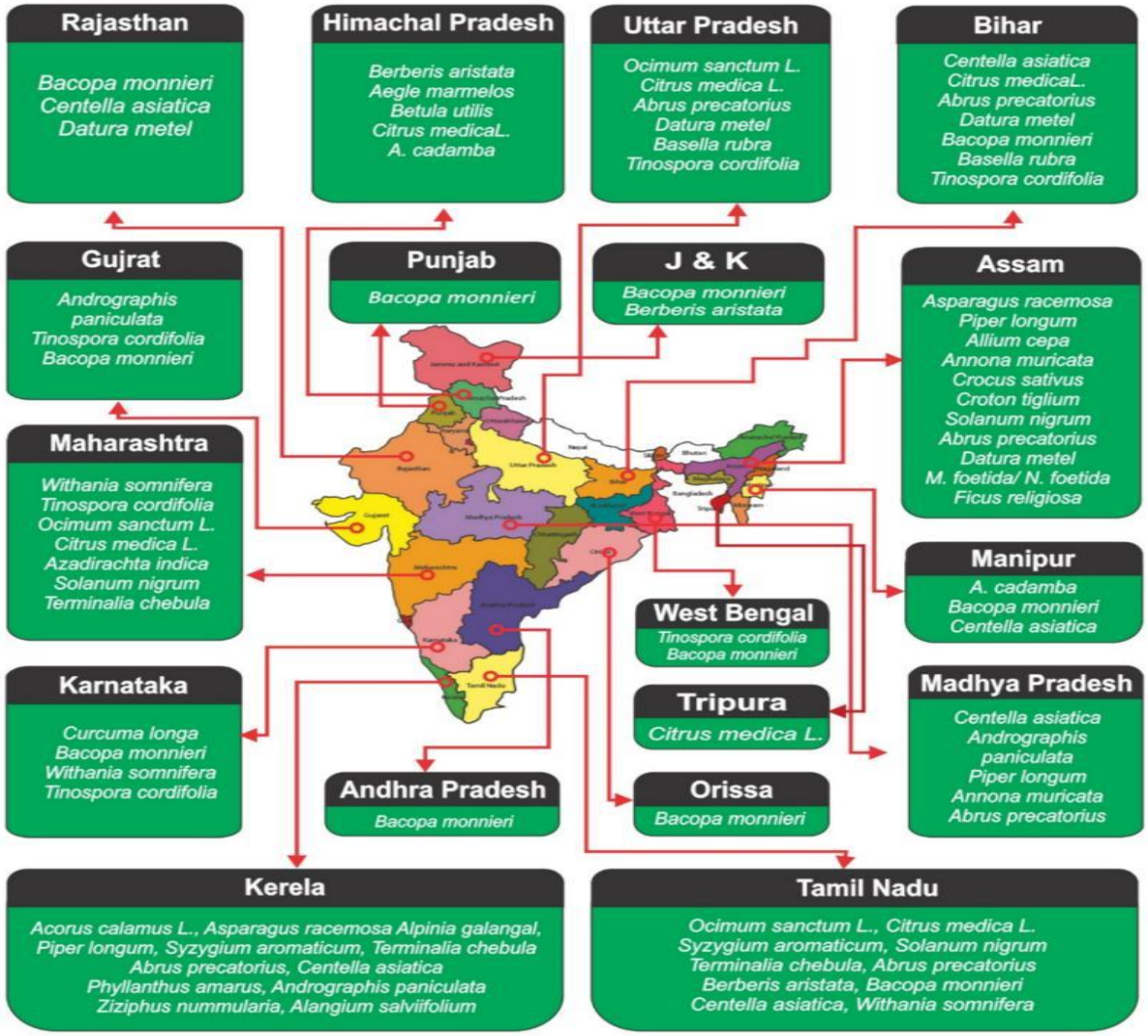


FIGURE 8

Inferences

Breast cancer is the most prevalent type of tumor in fema les in most parts of the world. Although stabilized in Eur opean countries, its incidence is increasing in different co ntinents. Reduction of breast cancer is tough because the reasons are not well known. We know of several risk fact ors such as nulliparity, later age at first maternity, little o r no breastfeeding, which, however, are linked to the hist orical development of human community. On the contrar y, a great effort is needed to improve early diagnosis of t he tumor. Screening plans among the female community should therefore be implemented. The first discovery of a small breast cancer leads to a very high price of curabilit y and entails quite mild types of treatment, with survival of the body image. Treatments are improving, but a strin gent multidisciplinary approach is essential. It is plausibl e that in all places specialized centres or units for breast c ancer control should be set up.

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