



# A Review of Literature on Breast cancer with Neural Network and Artificial Intelligence

By:

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## ABSTRACT

**Purpose:** The purpose is to understand how best we can, detect breast cancer using technology based on symptoms and tests. This paper is to understand by reading the literature published in this direction, to set a pace to do further doctoral research in this area. Cancer is increasing in large numbers and has brought challenges that are difficult to solve at the movement. Finding common things is the key to define what cancer could be covering India both Urban and rural.

**Design/ Methodology/ Approach:** The method is to analyze papers published in the recent years in the field of IT and medical. Medical oncology will cover diagnosis and publications of test results conducted on people and processes followed for longer survival of the patient.

**Findings/ Results:** The findings are analyzed and conceptualized in a tabular format for finding similarity and dissimilarity in the reports. The detailed situation can lead to changes and changes in terms of what can be avoided in terms of habits or food and life style. What needs to be changed based on the data is to be seen

**Originality:** This is a first attempt to find out the challenges faced by cancer patients from the inception of their detection of cancer in their life. Cancer can be controlled, treated and can be prevented if certain aspects are followed in a manner to prevent metastases. Metastases need to be prevented and hence cancer can be localized for better focus of treatment. Finding commonality using Neural networks for better understanding is a first attempt.

**Paper type:** Literature review for understanding commonality of the cancer treatment with AI and data analysis

**Key words:** Neural Network, Artificial Intelligence, Health, lifestyle, Data analytics, cancer detection software, Information technology, Spreading of cancer, Breast Cancer, Allopathy, Homeopathy, other forms of treatments

## 1. INTRODUCTION:

Cancer is seen very common in both urban and rural India. Cancer has its own challenges. It depletes the family of its financial resources. It creates lot of pain in the patients and their family members. Spiritually they feel deprived of their life's future.

In a society people have both good and bad habits. Many a times habits are not known, they are formed due to a process of a events in the family, society or culture in general. The medications that women take in terms of gynecological related treatments can also lead to hormonal imbalance. This hormonal imbalance can lead to disturbance in the process of cellular structure. Breast in a women is a symbol of love and affection. Breasts in general need to produce the nourishment and milk to the new born baby. The breast cellular structure is related to grow or to produce nutrients and various other proteins to the new born baby.

**Breast cancer** is prevalent in both the area of population like urban and rural. The rural population in interior parts of Dakshina kannada, or kasargod districts have the employment of rolling Beedi and it has become their livelihood. Tobacco causes cancer. Tobacco in any form; either inhaling or smoking leads to faster growth of cells in a given body part of a women.

**Causes of Breast cancer:** Gender, age, Family history, inherited genetic mutations, personal history, Hormone levels, radiation exposure, dense breast tissues, alcohol consumption, obesity, lack of physical activities, diet, no breast feeding, certain hormone therapies, environmental factors.

**Neural Networks:** They are simply known as Artificial neural networks, or simply in a two words neural nets. The key concepts are Neurons, layers, weights and biases, activation function, Feedforward and Backpropogation, Deep learning, Training, Convolutional Neural Networks, (CNN), Recurrent Neural Networks (RNN), Applications , Framework and many more.

**Detection of Breast cancer using Artificial Intelligence:** The following techniques can be used for detection of breast cancer, Computer aided detection( CAD), Mamography Interpretation, Breast ultra sound and MRI analysis, Pathology image analysis, Predictive analytics, Image enhancement, Data Integration, Telemedicine, Clinical Decision support, Follow-up and monitoring using data bases.

**Breast cancer Challenges:** Early detection and Diagnosis. It is essential that early detection is done in case if found some kind of discomfort. Limited availability of access to screening, It also leads to challenges to False positives and false negatives. Indicating of cancer when it is not present is false positives and missing cancer when it is present ( false negatives) can lead to wrong detection. The treatment challenges are it needs to be personalized and it needs to be Multimodal treatment, along with this the psychological trauma is the emotional distress, body image and self esteem as this brings in emotional agony. Cost of treatment is another challenge that women face. Awareness and education does lack in our women, and it is similar in all developing countries. Hence it is a global challenge. Data should be shared and connected world wide using networks to faster detect and cure.

## 2. OBJECTIVES OF SCHOLARY REVIEW:

1. To remember and recollect data of breast cancer based on data available both in primary and secondary sources.
2. To comprehend and known extensively using various scholarly articles published
3. To solve in a simple manner a complex problem, in terms of detection and cure
4. To compare contrast and breakdown literature published work wide in the past 15 years
5. To assess the effectiveness of various treatment methods and their publications
6. To create a synthesis or to come out with a portal or a mechanism so that women can get connected with similar problems

7. To analyze using ABCD analysis approach for a large scholarly work done so far.

**3. RESEARCH METHODOLOGY OF LITERATURE REVIEW:** The process followed in conducting this literature review is, identify scholarly papers that are published in journals which are latest and recent publications which are not more than 10 years old. Papers that are used for knowing cancer in dept, from various medical journals as well as various technical journals related to Information technology and artificial intelligence.

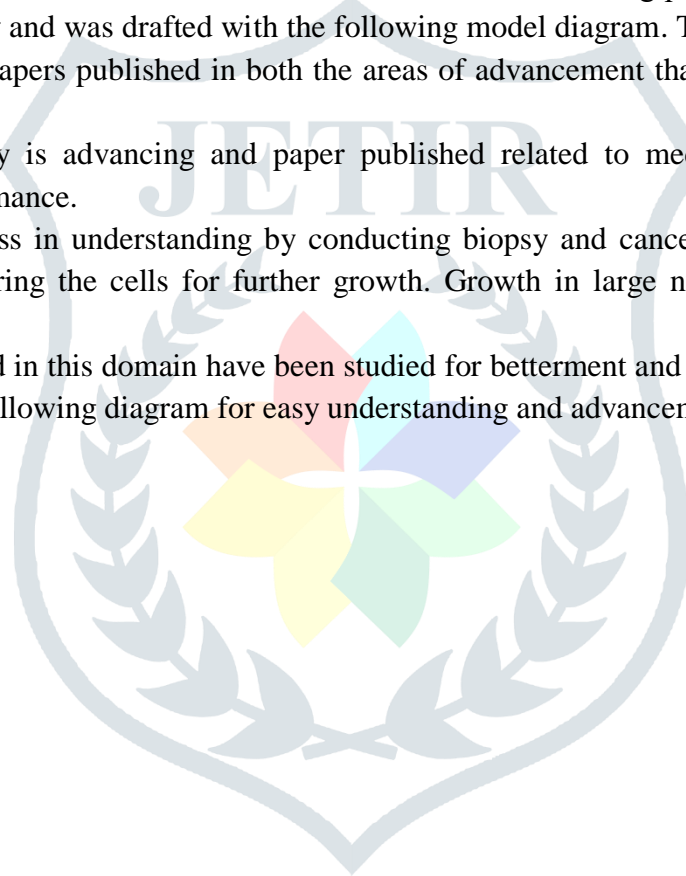
(1) Different search engines, including Google Scholar, Academia, and Cross Reference, were used to conduct keyword searches to identify numerous papers that have been authored and published. (2) Establish a standard for what should be included and excluded in the review process. (3) Screening for the practice of filtering the literature. (4) Compile the final group of publications that have been published into a theoretical framework for vectors. that influence patients for cancer detection and diagnosis.

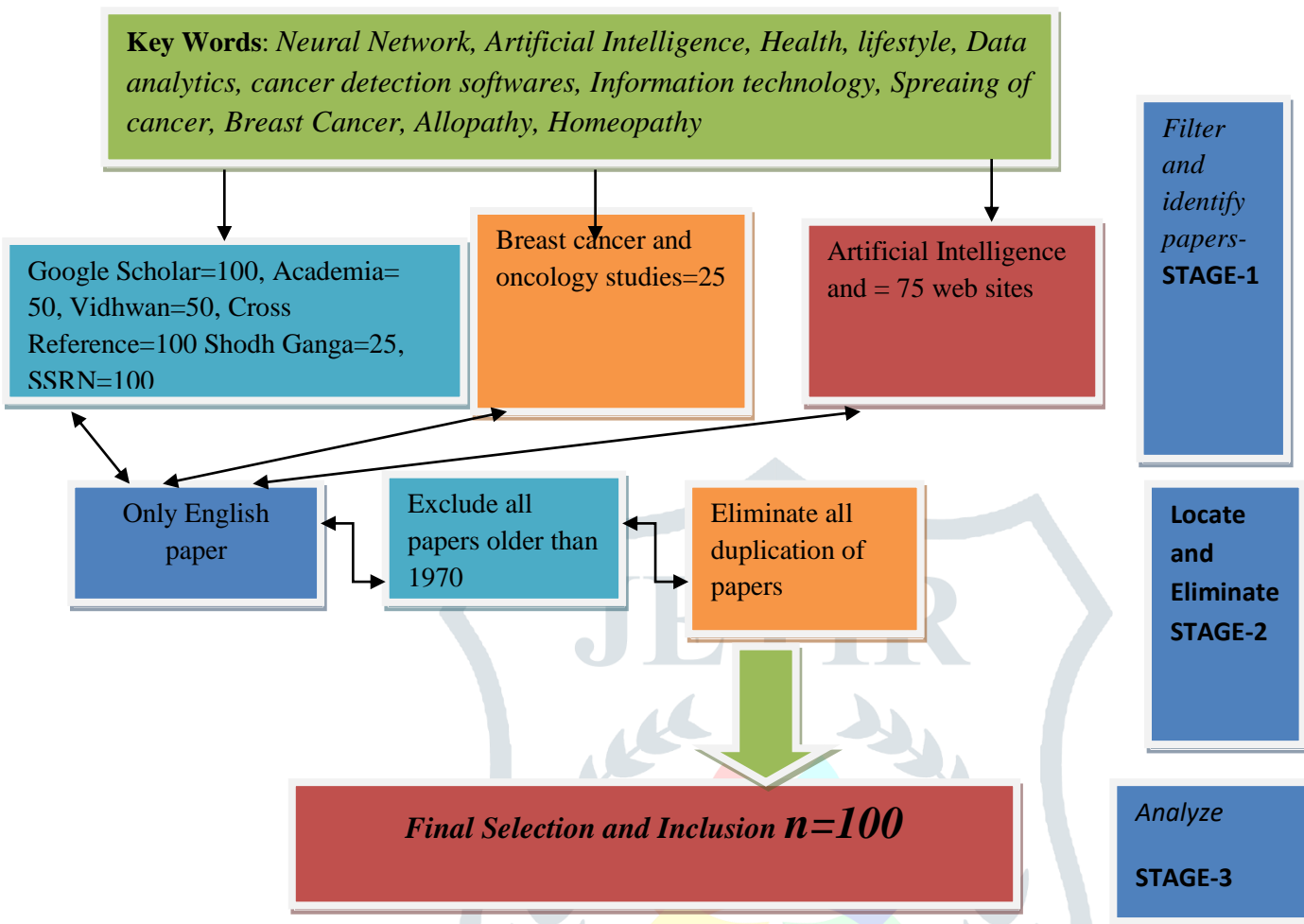
A conceptual framework that takes into account the variables influencing patients' suffering and has been developed for the study and was drafted with the following model diagram. This below diagram will help us to clearly go through papers published in both the areas of advancement that is Oncology and Information technology.

Information technology is advancing and paper published related to medical information can make a difference in its performance.

There has been progress in understanding by conducting biopsy and cancer detection. Biopsy reports do indicate through nurturing the cells for further growth. Growth in large numbers indicates the cancer is prevalent in patients.

Hence papers published in this domain have been studied for betterment and problem solving. The same has been indicated in the following diagram for easy understanding and advancement.





**Fig No: 1 Model showing how literature study was done**

**Source: Author**

- 4. SCHOLARLY REVIEW OF LITERATURE REVIEW:** The following papers are listed in a matrix format for easy understanding of paper published across various journals and web sites. These papers are connected based on their quality and relevancy in terms of Information technology (IT) as well as the medical industry. Medical industry is vast and the areas of research are not just limited to medicines but also on the entire Anatomy of human evolution. There are certain diseases that are rare and new and hence they need medicines. Information is the key to solve any problem. Hence the following literature review has been done based on the requirement for further research in this area. Based on the literature review a research proposal has also been enclosed in this paper.

**According to Cowin.P. et.al., (2005)[1]** there are latest trends in breast cancer, such as chemotherapy and radiotherapy. These therapies are a challenge that currently Indians are facing today. As per Zhu. H.P (2017)[2] the challenges that breast cancer patients are facing are detection. Cancer if not detected can lead to fatalities, especially in rural areas. These challenges are faced in India too. Indeed Sharma.k.et.al., (2010)[3] in his research papers speaks about data on breast cancer. Data is critical for enhancing problem solving. Data leads to commonality and identification of success.

**Line of treatment is the key and** continuity as per Waks.A.G & Winer E.P (2019)[4], this leads to a scope of new methods of making things happen to patients. Patients can make attempts to try new methods to

solve the pain due to the process. According to Sariego, J. (2010) [5], the treatments currently followed in the world are that of creating a new process with old medicines. Medicines potency and its intensity can be altered as per age and stage of the patient. Medical equipments that make treatment comfortable in a pain of a breast cancer patients. according to Musgrove, E. A. et.al.,(2004)[6] the price of the equipments can determine overall treatments. Treatments cost can be brought down to make things to these patients.

**According to Crivellari, D., Aapro et.al.,(2007)[7]** growth of cancer cells can be a challenge in solving problems. Sudden growth becomes uncontrollable and spreads across other parts of the body. Data plays a major role in understanding things better. Men too get breast cancer and face challenges, as per Etzioni, D. A., et.al.,(2003)[8] it is generally less detected in men and if not it could be detrimental if not detected. Men face challenges in certain parts of the world. According to Ganz, P. A. (2008) [9] educating patients is the key. Data related to educating patients need to be stored for knowing the impact of the same. Educating patients is an essential component to instill confidence and strength.

Detection at an early stage can save a life According to Cowin, P., Rowlands, T. M., (2005) [10] detection needs to be fast and immediate to benefit many patients. Patients have a challenge when things go out of control. As the hormonal imbalance causes to create Cancer according to Sun, Y. S., Zhao, et.al.,(2017)[11] it needs to be checked and controlled. Family planning tablets have an impact on hormonal imbalance according to Sharma, G.N.et.al., (2010) [12] it is the long term in-take of hormonal tablets can cause more danger to patients. Dress materials that are too tight can prevent blood circulation, according to Waks, A. et.al.,(2019).[13], certain polyester materials can cause harm over a period of time. Breast feeding over a long period of time has better benefits as per Aruna et.al., (2011)[14], it creates better blood circulation and hormonal balances when breast feeding is done for a long period of time. Breasts are an integral part of a women's body and beauty; post surgery according to Tang, J., Rangayyan, et.al., (2009) [15],it is important to be counseled through a professional counselor for a better mind set approach. Lumps do form in the breasts of women and they need to detected by the women itself in the primary process of detection according to Lavanya, D., & Rani, K. U. (2012). [16], it is easy for any women to know any lump formation if she is aware of changes that are happening in her life.

**The testing should be made compulsory** either through amendments in the medical regulations or through spread of awareness as per Carmichael, A. R. (2006) [17], this will help faster detection and problem solving by making it a process that is compulsory. Breast cancer treatment is expensive according to Lorincz, A. M.,et.al., (2006). [18], it is important that state governments should contribute to certain extent to help the patient come out the financial burden for an effective treatment.

**Starving cancer from protein is the key to success**, in the publication according to Brown, K. A., et.al., (2010). [19], food is an important component for maintaining right protein levels. Information technology can help solve this problem. Certain milk foods have higher protein and can cause faster growth of cancer cells, according to Melnik, B. C., et.al., (2023) [20] it is seen that certain injections and chemicals play a pivotal role in making high milk yields in cows. This can lead to faster growth of cancer cells in a patient. Hence heavy protein foods can be dangerous to patients in the immediate term according to Duarte,D.C, et.al., (2011)[21] we should avoid proteins in large quantities for easy recovery. Life style like smoking needs to be avoided according to Reynolds, P. (2013). [22], smoking triggers further growth of cancer as it activates the cancer cells due to the nicotine present. Hence inhaling or consuming Tobacco in any form can cause cancer according to Hecht, S. S. (2002). [23] it is evident that it further enhances the growth of cancer. Radiation causes cancer and this can be line of treatment according to Hankey, B. F.,et.al., (1983). [24], it also further repeats the existence of cancer. It is also found that sexual activity, sucking of nipples regularly reduces the chances of cancer, according to Emilee, G. ,et.al., (2010). [25], sex is a positive process and releases happiness chemicals in a body, hence it is evident that sex reduces the chances of breast cancer.

**When alcohol is consumed** it creates activation of certain end organs like, kidney, liver, heart as well as breasts, according to Dumitrescu, R. G., et.al (2005). [26], alcohol consumption during the treatment will affect in a negative manner for curing cancer. Hence mind-set is the key to success, a strong mind to face the challenge is a must according to Tiedtke, C., et.al., (2012)[27], we need a strong mind in a strong body to overcome cancer.

When we read a publication by Smith, A. P. et.al., (2004) [28], technology plays a pivotal role in analyzing certain common situations. Hence technology is need to analyze large medical data based on every component of a human body and the types of cancer that is spreading in the society. According to Rimer, B. K., & Winer, E. P. (1997). [29], overweight is one of the major reasons for cancer. It does create imbalance in terms of activities in the human body. Over weight is due to chemicals in the form of preservatives and steroids trigger the cancer cell formation for quick growth according to Franceschi, S., et.al., (1995). [30], it better to eat fresh foods rather than foods with preservatives. **Diabetes is effecting** large parts of the population which is a lifestyle problems in many cases, according to Wolf, I., et.al., (2005)[31], it become more challenging while treating cancer patients. **High blood pressure can create blood clots in the brain** and this can damage the survival of a patient in one of the papers published by Manjer, J., et.al., (2001). [32], states that blood pressure triggers various heart related problems and will lead to further damage of the patient who is undergoing cancer treatment. **T.B kills patients if not treated for 6 to 9 months**, the article published by Akbulut, et.al (2011) [33], says that T.B and cancer together can be more fatal when both affect a patient.

**Age is a factor in favour** of young girls effected by breast cancer, in one of the publications it is stated by Terry, M. B. et.al., (2017). [34], that young girls too are affected by breast cancer. Treating them is slightly easy as age and recovery is faster. Trichopoulos, D., et.al., (1972). [35], in their publication speak about how menopause can lead to changes in the breasts in terms of their size and tumor formation. This also means that there is a relationship between human cycles and creation of babies. Modern life has many gadgets and these gadgets run through frequencies of emission, transmission and radiation, they do have chemicals which are carcinogenic and dangerous, as per Mansour, R. F. (2020) [36], radiation from gadgets can create more impact on cancer formation in women's body as they are exposed to long periods of time to certain paints, equipments and chemicals at home.

**Data on human habits** is difficult to track unless there is permission from an individual to observe this according to Wulfkuhle, J. D. et.al., (2001). [37], data analytics on movement of people and their exposure to certain chemicals and ultraviolet rays are important to figure out so that exposure may be reduced consciously.

**Profession** that make people to get exposed to heavy radiation like working in an x-ray center, or working in research laboratories or working in a nuclear reactor can also cause cancer to a large extent as per Amir, Z., Scully, J., & Borrill, C. (2004)[38]. This also can be one of the key reasons to breast cancer. Beedi rollers and cigarette factory workers have been found to be detected with cancer more frequently than other professions.

**Professional life** and personal life needs a fine balance according to Nietzsche, A., Driller, E., (2013). [39], work life balance is required to have a better life that leads to happiness and less stress; as stress causes a negative emotion. It leads to acidity. Acidic environment inside a body thrive cancer. Positive thoughts and constructive thoughts are considered as non acidic environment as per Casellas-Grau, A., et.al., (2014) [40], which can lead to better solutions. Anything constructive and reproductive can reduce the chances of cancer according to Martínez, M. T., et.al., (2018). [41] reproducing more babies can reduce the chances of cancer. This is an observation based on rural women in many parts of the world. More time to have sex is one reason for more babies and sex is a constructive feeling according to Marsh, S., Borges, et.al., (2020) [42], it creates an environment of recreation and creation which eliminates negative emotions.

**Age is an important** factor to reduce cancer, as per McGuire, A., et al., (2015) [43], age band between 30 to 55 is very critical for women, once detected surgery is the better way to eliminate tumors and followed by therapies according to Cordeiro, P. G. (2008) [44], it better to undergo surgery for the part which is affected. Many a times it has been seen that drop in intake of medicines can lead to repetitive occurrence of breast cancer as per Atkins, L., et al., (2006) [45], it is due to lack of money or proper follow up by family members.

**Regular screening is a must for** both post surgery and post therapy treatments Bevers, T. B., et al., (2009) [46] states that it is mandatory to have frequent visits for another 3 to 4 years. This also states that every women needs to do physical examination very frequently by themselves as per Hassan, L. M., et al., (2015) [47]. Information technology with AI tools are revolutionizing various aspects of human lives, as per Fatima, B., & Amine, C. M. (2012)[48], it is observed that AI tools can relieve people of certain burdens in treating cancer patients.

**According to Davis, D., et al., (1993).** [49] , it is a concern to the entire family when one individual suffers from breast cancer. It becomes more of a challenge to the entire family rather than an individual. Hence the whole family should work towards knowing and applying IT solutions to help the patient come out of the problem as per Lavanya, D., & Rani, K. U. (2012) [50]. A centralized data center is the key to success as per, Sheth, D., & Giger, M. L. (2020). [51], this would help researchers to access information at a faster pace. Data makes things faster and easier to access according to Insa, A., et al., (1999) [52], very less data is found in terms of the causes on a global scale. It is important to bridge the gap to avoid challenges in making solutions.

**Exercise is the** key to solving obesity and less blood circulation. Stout, N. L., et al., (2012). [53] Good exercise is missing in many women due to daily chores at home and lack of time as they have many things to be taken care off. Alternative treatments are available and are difficult to be measured in terms of their results Vutakuri, N., & Somara, S. (2018). [54]. According to Mittal, L., et al., (2021). [55] yunani treatment had promising results in breast cancer and the effectiveness has reduced do to its resistance developed in women over large parts of our nation. Siddha medication and treatment has an impact on patients due to lack of better lab facilities it is difficult to analyze these results as per Sowmyalakshmi, S., et al., (2005). [56]. Currently the chemo therapy or chemical therapy has been found to prevent deaths as data on the same is available in terms of administration of the treatment according to Hausmann, J et al., (2020) [57]. The consequence of radio therapy has an impact on women as their strength in general is weak when compared to men. According to Lomax, M. E., et al., (2013)[58] it has an impact long term on women as repetition of cancer is possible in other parts of the body.

Obesity index is high in few countries and obesity causes challenges in the body due to lack of activity coupled with over eating as per Barrios, C. H. (2022)[59], obesity needs to be brought down by checking BMI on a regular basis. Non obese people try to do breast implants to feel confident. The materials used are still under observations as they are tend to be carcinogenic in nature according to Schiff, M., et al., (2014). [60].

**Protein supplements** are many and they are flooded in the market space in training centers and are also sold over the counters of medical shops with-out a competent authority certifying according to Dwyer, J. T., et al., (2018) [61].

**Beauty surgeries have an** impact on people as they sometimes damage and cause negative effects on women according to Affinati, A. H., et al., (2019)[62], certain implants and chemicals are harmful and cancerous. In some cases removal or reshape of a breast can be experimental and few nations like Thailand are known for such surgeries according to Yang, J. D., Lee, J. W., Cho, et al., (2012) [63] it is business of a high intensity, this may sometimes lead to faulty procedures.

**Neural link** nano particles are implanted to detect the growth of cancer cells in individual women, according to Fiani, B., et al., (2021). [64], this line of detection of cancer is yet to be found in terms of side effects. Computer aided design generates certain patterns which can lead to better visualization to detect things faster according to Jiang, Y., et al., (1999). [65], generating designs on patterns is very helpful to

doctors treating patients. AI leads to better process when compared to traditional technology, as per Shah, S. M., Khan et.al., (2022) [66] AI is the key to faster analysis of sensing through seeing, smelling and listening of cancer cell communication within the body of a patient.

**Cancer detection software** can make a difference in terms of developing a faster detection system. A software that can smell, listen, read a pulse and many more can make a difference as per Becker, A. S., et.al., (2017) [67], in their publication. Indeed such software can be developed using Dogs Intelligence of smelling and developing a device which has sensors just like the nose of a dog.

**Post operation of a cancer patient** is the critical phase as the immune system collapses to a large extent; it makes the patient vulnerable for attacks like T.B, Jaundice, or just fever as per Marta, G. N., et.al.,(2020). [68] in the publication mentioning the care to be taken post operation. Gadgets that can further detect cancer as per De Cicco, P., et.al., I. (2019). [69], is essential to prevent further mutation and spread of cancer to different parts post treatment.

**Detection of radiation** is essential to make women aware of radiation that they are going to be exposed as per Alawad, S.,et.al., (2021) [70]. Gadgets that can detect radiation has to be incorporated in the mobile equipment itself is the key. Neural networks for cancer detection is the key to data analysis which could be automatic as per Nasser, I. M., & Abu-Naser, S. S. (2019). [71], predicting and preventing cancer is important as per Cardinale, D et.al.,(2017). [72], that it can be detected and gene modification need to be done. Uterus cancer is also rampant when compared to breast cancer. Breast cancer can also lead to uterus cancer as per Felix, A. S., & Brinton, L. A. (2018) [74]. Social media can play a vital role in developing and disseminating information as per Pacheco, A. G., & Krohling, R. A. (2020). [75]. Social media has an impact on spread of information.

According to Nennecke, A., et.al. (2014 ) [76], information technology can play a vital role in bridging the gap between urban and rural women in general.

T.V, Cinema has an impact on people in terms of information and entertainment as per Atkin, C. K., et.al., (2008)[77], it is clear that media plays a role in the help of solving problems.

Mobile vans for cancer detection is easy to help women in up country areas for better and faster access to detections systems as per Greenwald, Z. R., et.al., (2017) [78]. Immunity is the key to prevent cancer. Building immunity is important aspect to make things happen in favor of cancer patients as per Amens, J. N., et.al., (2021) [79]. Acidity leads to low bone strength this can prevent the overall immunity of a women as per Holmes, M. D., et al., (1999). [80], it is critical to prevent women from having high acidity in their body. Cancer can thrive in the bodies of women as per Hansen, M. F et.al., (2017) [81].

Turmeric can prevent cancer, latest research says that it can cure any kind of swelling and inflammation as per Hutchins-Wolfbrandt, A., & Mistry, A. M. (2011) [82].

Post surgery immunity needs to be boosted and information on how many survived is not available as information technology is not advanced to such an extent that covers a nation in general as per Ryhänen, A. et.al.,(2010) [83]. Multiple sources of information using AI is important to make easy access to types of medicines and types of treatment and its effect as per Tan, P., et.al., (2023, January) [84]. Money is important to buy medicines and money is essential for treatment. Insurance is required to cover expenses according to Zafar, S. Y et.al., (2013) [85], insurance coverage is important to make ends meet for a family, many patients do not have adequate cover in terms of insurance and financial back-up.

Attending session is an essential requirement for a cancer patient. AI plays a role in developing things faster in the process of reminding people to attend sessions as per Cohen, I. G. (2019). [86]. Thinking is internal and internal process can damage the outside and hence positive thinking has to be created and reinforced according to Wood, J. V.et.al., (1985). [87]. Community involvement and religious involvement makes a difference, according to Fox, S. A., et.al., (1998) [88], religion, social involvement are required for doing better in health. Yoga and participation in a social gathering will make more involvement, according to



Galantino, M. L., Greene, L., et.al.,(2012) [89] yoga can change the thinking and change in thinking can lead to change in body. Daily exercise and daily yoga can make a long term impact on breast cancer patients, according to Travier, N., et.,(2015) [90], it is required to do daily exercise. Cancer wellness and AI tools that can help in connecting videos and audio's to patients is very helpful according to Jiang, F., et.al.,(2017) [91]. Palliate and hospice treatment is needed for treatment according to Mo, L., Urbauer, D.et.al., (2021) [92], According to Megdal, S. P., Kroenke, C. H. et.al., (2005). [93] breast cancer due to radiation effects of a job is invisible for making.

According to Sajnani, K., et.al.,(2017). [94], genetic mutations has effect on generation to generation. Hereditary impact as per Bogdanova, N., Helbig, S., & Dörk, T. (2013)[95] will happen over a period of time.

According to Chen, S., Cheng, A., & Mehta, K. (2013) [96] connecting patients and tele-medicines will change the way treatment is conducted. According to Simon, G. et.al., (2000) [97]confidentiality of the information is important for every patient. Demirguc-Kunt, et.al., (2018) [98] making people aware will make breast cancer prevention in the long run. Centralized reporting will help a lot according to Absolom, K., Holch, P., Warrington, L., Samy, F., et.al., (2017) [99] data makes an easy analysis. Courneya, K. S. (2003)[100]. ABCD analysis, make easy process of understanding a system as per Aithal, P. S. (2017) [101]

The details of the papers are as follows:

**Table: 1 Literature review of 100 papers for the basis of proposing a research proposal.**

Slno	Research Area	Focus	Reference
1	Breast cancer treatments	Current trends and advancement	Cowin, P.et.al.,(2005)[1]
2	Breast cancer and India	Challenges that Indians are Facing in terms of detection	Zhu. H.P (2017)[2]
3	Data on Breast Cancer	India and other developing nations	Sharma.k.et.al., (2010)[3]
4	Line of treatment	Scope for application of New technologies	Waks.A.G & Winer E.P (2019)[4]
5	Breast cancer and its therapies	Methods currently followed in the world	Sariego, J. (2010) [5]
6	Medical equipments and its challenges in performance	Systems and procedures followed in the world	Musgrove, E. A. et.al.,(2004)[6]
7	Growth of cancer cell	Causes and remedies that can be adopted	Crivellari, D., Apro et.al.,(2007)[7]
8	Breast cancer in Men	Men too get affected due to breast cancer and its prevalence	Etzioni, D. A., et.al.,(2003)[8]
9	Making people educated about breast cancer	Social media and T,V media's role in making awareness of breast cancer	Ganz, P. A. (2008) [9]
10	Detection breast cancer	Methods and techniques that women should follow	Cowin, P., Rowlands, T. M., (2005) [10]
11	Harmon imbalance and its effects	Harmon creates activities towards growth	Sun, Y. S., Zhao, et.al.,(2017)[11]
12	Family planning tablets and its effects	Studying cancer due to family planning tablets	Sharma, G.N.et.al., (2010) [12]
13	Breast size and dress materials	Plastic, Polyester and other chemicals	Waks, A. et.al.,(2019).[13]

14	Breast feeding and cancer	Reduction of cancer when breast feeding is done for a long time	Aruna et.al., (2011)[14]
15	Breast is the beauty or a women,	After surgery its impact on the mind and overall feelings	Tang, J., Rangayyan, et.al., (2009) [15]
16	Breast and lump	Using mirror tests to detect lumps physically	Lavanya, D., & Rani, K. U. (2012). [16]
17	Making Tests compulsorily	Government policies towards testing is the key	Carmichael, A. R. (2006) [17]
18	Breast cancer treatment and expenses	The cost of treatment and insurance coverage makes a difference	Lorincz, A. M.,et.al., (2006). [18]
19	Food and breast cancer	Food makes things easier	Brown, K. A., et.al., (2010). [19]
20	Milk and its impact	Consuming cow milk and buffalo milk	Melnik, B. C., et.al., (2023) [20]
21	Heavy protein food causes breast cancer	Protein food based out of animal and vegetable	Duarte,D.C, et.al., (2011)[21]
22	Smoking and breast cancer	Effects of smoking and number of cigerrates per day	Reynolds, P. (2013). [22]
23	Tobacco and breast cancer	Inhaling of tobacco through nose in the form of snuff powders	Hecht, S. S. (2002). [23]
24	Breast cancer and effects of radiation	Breast cancer due to radiation	Hankey, B. F.,et.al., (1983). [24]
25	Breast cancer and sex	Sexual activities creates reduction in breast cancer	Emilee, G. ,et.al., (2010). [25]
26	Alcohol and breast cancer	Alcohol causes breast cancer	Dumitrescu, R. G.,et.al (2005). [26]
27	Preparing people mentally to face challenges	Undergoing trauma needs new mind sets	Tiedtke, C., et.al., (2012)[27]
28	Technology in cancer treatment	Information technology and making	Smith, A. P.et.al.,(2004) [28]
29	Breast cancer and weight	Over weight also leads to imbalance of life	Rimer, B. K., & Winer, E. P. (1997). [29]
30	Breast cancer and food	Foods are added with preservatives and chemicals that enhance taste. Taste makers also lead to cause of cancer	Franceschi, S.,et.al., (1995). [30]
31	Breast cancer and problems like diabetes	Diabetes is not a disease but a malfunction of an organ that, which releases insulin.	Wolf, I.,et.al., (2005)[31]
32	Breast cancer and blood pressure	High BP can create clots in the brain and can lead to paralysis and complications	Manjer, J., et.al., (2001). [32]
33	Breast cancer and T.B	T,B is curable with multiple drug therapy, multiple drug therapy can interfere with cancer treatment	Akbulut, et.al (2011) [33]
34	Girls and breast cancer	Young girls are not much	Terry, M. B.et.al.,

		detected with cancer	(2017). [34]
35	Menopause and breast cancer	This is caused by body cycles of a women	Trichopoulos, D.,et.al., (1972). [35]
36	Gadgets and Breast cancer	Radiation causes cancer. Electronic gadgets do interfere with the harmons	Mansour, R. F. (2020) [36]
37	Data analytics and breast cancer	Data shows a very clear indication of habits towards cancer	Wulfkuhle, J. D.et.al., (2001). [37]
38	Profession and breast cancer	Working hours can affect things too fast. Delayed food consumption and packed food can make a difference.	Amir, Z., Scully, J., & Borrill, C. (2004)[38]
39	Work life balance and breast cancer	Working and family life balance leads to stress.	Nitzsche, A., Driller, E., (2013). [39]
40	Positive thoughts leads a better health	Positive thoughts can make a difference. Warm feelings of good life is the key to happiness	Casellas-Grau, A., et.al., (2014) [40]
41	Number of children and breast cancer	Delivery of children and more breast feeding can bring new feelings towards the young life	Martínez, M. T.,et.al.,(2018). [41]
42	Sexual habits and breast cancer	Sex has a positive feeling. Sex also leads to belongingness and is a positive emotion. Positive feeling can eliminate acidity; as acidity in the blood is one of the leading factors for cancer	Marsh, S., Borges,et.al.,(2020) [42]
43	Age and its implications on breast cancer	Age is a factor that leads to many different diseases. Cancer is one of them	McGuire, A.,et.al., (2015) [43]
44	Surgery and breast cancer	Surgery of cancer is an immediate solution. It is not the end to it, surgery is the beginning of removal of extra growth	Cordeiro, P. G. (2008) [44]
45	Medication and Breast cancer	It is essential to take medication on a regular basis. Cancer drugs are powerful and it needs to be balanced with a good diet.	Atkins, L.,et.al., (2006) [45]
46	Screening and testing of breast cancer	Cancer needs to be screened at regular intervals. Testing is essential. Testing can help detect faster	Bevers, T. B.,et.al., (2009) [46]
47	Physical examination of breast cancer	Every women needs to touch and feel the breasts and should do physical examination by self. This leads to easy detection	Hassan, L. M.,et.al., (2015) [47]
48	Information technology and its support for	Computers and software used in MRI scanning machines,	Fatima, B., & Amine, C. M. (2012)[48]

	cancer detection	help detect any kind of clot or growth which is not in the right direction.	
49	Cancer a cause for concern	It is a concern to the family as well as the organization where they work	Davis, D.et.al.,(1993). [49]
50	IT and breast cancer	Information technology is the key to growth	Lavanya, D., & Rani, K. U. (2012) [50]
51	AI and breast cancer	Central command center for analyzing data of various labs	Sheth, D., & Giger, M. L. (2020). [51]
52	Data analysis location wise	Observation and reading of this large scale data is the key to success	Insa, A.,et.al., (1999) [52]
53	Exercise and cancer occurrence	Good health is possible with good feeling and good feelings are possible with good exercise	Stout, N. L.et.al., (2012). [53]
54	Ayurveda and cancer treatments	Alternate treatments are available and hence they should be connected with the existing medical systems for prevention and detection.	Vutakuri, N., & Somara, S. (2018). [54]
55	Yunani and cancer treatment	AYUSH is the short form of Ayurveda, Yunani, Siddha and Homeopathy line of treatment	Mittal, L., et.al.,(2021). [55]
56	Siddha Medication and cancer treatment	Siddha medicines are available only with few sages and hindu religious scriptures	Sowmyalakshmi, S., et.al., (2005). [56]
57	Chem-therapy and its consequences	Chemo therapy is strong and has its own challenges.	Hausmann, J et.al., (2020) [57]
58	Radio therapy and its consequences	Radio therapy in turn causes cancer	Lomax, M. E.,et.al., (2013)[58]
59	Global challenges that women face because of over weight	Obesity needs to be brought down and obesity can create faster growth of cancer cells if detected	Barrios, C. H. (2022)[59]
60	Breast implants and its effects	Implants used have a long term effects as they remain inside the body. Chemicals in the implants have an implication on the health	Schiff, M., et.al., (2014). [60]
61	Health supplements and it challenges	There are many supplements in the current market. These supplement are ideally suitable for people who do constant check of their health	Dwyer, J. T., et.al., (2018) [61]
62	Surgeries and its impact on an individual	Surgeries have an effect on people, psychologically.	Affinati, A. H.,et.al., (2019)[62]
63	Surgery and breast removal	Removing of breasts has an implications on their mind	Yang, J. D., Lee, J. W., Cho, et.a;., (2012) [63]
64	Neural link and cancer treatment	Neural link can rescue many people as nano detection	Fiani, B., et.al., (2021). [64]

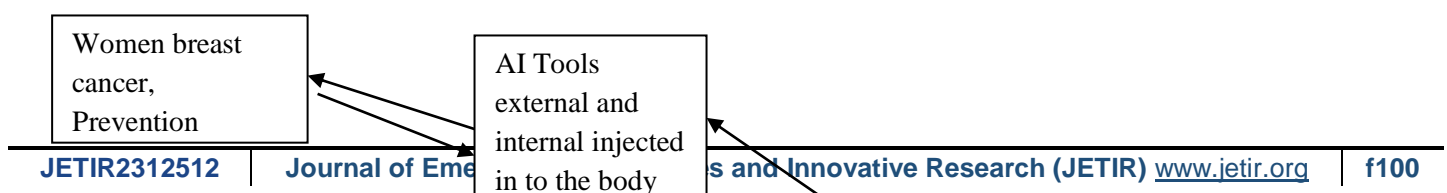
		machines can be implanted inside the body to detect	
65	Computers aided design to detect	Better designs to make better tools and processes	Jiang, Y., et.al., (1999). [65]
66	Artificial intelligence	Has made things easier and faster in analyzing data	Shah, S. M., Khan et.al., (2022) [66]
67	Cancer detection software	Better, new and faster cancer detection needed	Becker, A. S., et.al., (2017) [67]
68	Post operation and breast cancer	Post operation women needs care and rest	Marta, G. N., et.al.,(2020). [68]
69	Prevention of after effects of breast cancer	Using information technology and advanced gadgets we need to prevent breast cancer	De Cicco, P., et.al., I. (2019). [69]
70	Making women aware of things not be exposed to radiation	AI should allow us to learn about radiation in various forms. It should help us in tracking radiation	Alawad, S., et.al., (2021). [70]
71	Neural networks for cancer detection	Neural networks need to help people to know various types of treatment based on tracking systems	Nasser, I. M., & Abu-Naser, S. S. (2019). [71]
72	Predicting and preventing all types of cancers	Prevention of all types of cancers are possible based on the information available. Social media plays a major role	Cardinale, D et.al.,(2017). [72]
73	Cervical cancer	Cervical cancer is spreading and detection at hospital and vaccines for the same are being used and we need to make sure it reduces the causes	Cohen, P. A., et.al., (2019). [73]
74	Uterus cancer	AI and neural link technology should make sure that the medicines taken are tracked and detection of any kind of tumors should be an easy process	Felix, A. S., & Brinton, L. A. (2018) [74]
75	Information and cancer detection	Information of the same should be spread in all medias that women are exposed	Pacheco, A. G., & Krohling, R. A. (2020). [75]
76	Computing data based on urban and rural cancer	Urban and rural women have challenges in disposing of sanitary napkins. Chemicals used in Napkins for absorption has a role to play in creating cancer	Nennecke, A., et.al. (2014 ) [76]
77	T.V and social media awareness on cancer	AI should be used for analyzing things of the past and make things happen for easy detection	Atkin, C. K., et.al., (2008) [77]
78	Mobile vans to detect cancer and cancer testing	Cancer testing vans and cancer awareness vans can change the way we look at things. Pap smear test is key to detect	Greenwald, Z. R., et.al., (2017). [78]

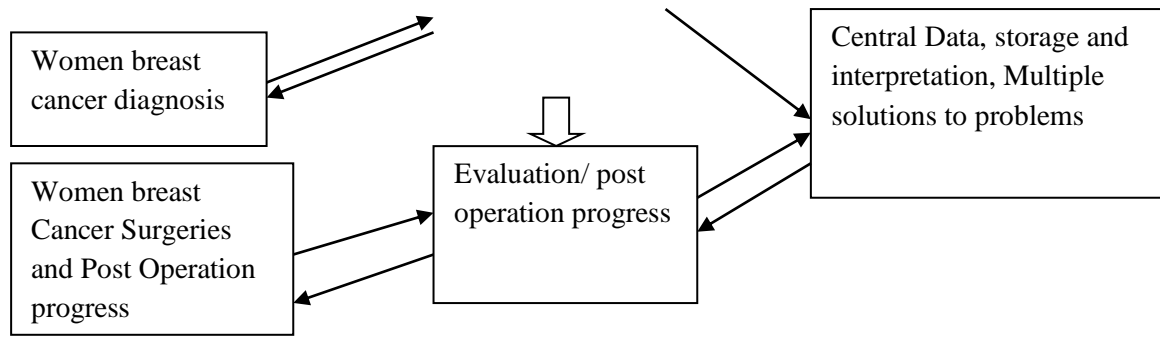
		things faster	
79	Creating and developing better immune systems	Immunity is the key to positive health. Measuring of immunity is essential for success. AI can detect the mind set of people	Amens, J. N., et.al., (2021) [79]
80	Acidity and hyper acidity in women	Acidity can create more problems than harm. Acidity is caused by well water, food that is acidic and citric.	Holmes, M. D., et al., (1999). [80]
81	Acidic food and its effects on cancer	Cancer thrives in acidity and cancer can grow at a faster pace in acidity.	Hansen, M. F et.al., (2017) [81]
82	Turmeric and cancer	Turmeric has been proved to eliminate any kind of inflammation. Cancer is a kind of inflammation. Inflammation can lead to tumor formation.	Hutchins-Wolfbrandt, A., & Mistry, A. M. (2011) [82]
83	Information technology and its impact on post surgery of breast cancer	Post surgery data is crucial to track the performance of cancer treatment	Ryhänen, A. et.al.,(2010) [83]
84	Artificial intelligence and prevention of cancer	Cancer can be prevented if we have advance networking systems that can track all labs through one server	Tan, P., et.al., (2023, January) [84]
85	Insurance and financial assistance in cancer detection	Cancer treatment is costly and if it can be done in a cost effective manner then cancer can be cured easily. Every individual need more insurance coverage to handle such costly treatments	Zafar, S. Y et.al., (2013) [85]
86	Artificial intelligence in reminding people to attend cancer sessions	Cancer sessions need to be conducted at hospitals and apartment associations. Association needs to develop things to happen the possibility of women getting together	Cohen, I. G. (2019). [86]
87	Fundamental difference in thinking	Thinking needs to be positive and AI should develop versions that detect and inform an individual to be positive	Wood, J. V.et.al., (1985). [87]
88	Religion and breast cancer. Data caste wise, religion wise and its influence	Community studies have been done to detect cancer. Demographic wise data is the key to know the influence	Fox, S. A., et.al., (1998) [88]
89	Creating and making things happen by Yoga	Yoga can change one's thinking and this can lead to better work life balance in women	Galantino, M. L., Greene, L., et.al.,(2012) [89]
90	Daily exercise and cancer	Every day exercise is a must. Data that can be collected through smart gadgets is the key to grow.Mobile	Travier, N., et.,(2015) [90]

		applications on how much distance we have walked etc.	
91	Artificial intelligence and its impact in cancer wellness	Cancer can be cured by installing AI tools at home for faster detection and cure	Jiang, F., et.al.,(2017) [91]
92	Palliate and hospice treatment	Every city needs to have palliate and hospice treatment facility for post operative treatment	Mo, L., Urbauer, D.et.al., (2021) [92]
93	Breast cancer due to radiation effects in job	Certain jobs like working in a nuclear reactor jobs or working in x ray unit, or in power transmission lines with high magnetic intensity can cause cancer	Megdal, S. P., Kroenke, C. H. et.al., (2005). [93]
94	Genetic mutation and its impact on cancer	Genetic mutation cause breast cancer	Sajnani, K., et.al.,(2017). [94]
95	Hereditary impact on patients	Hereditary aspects do lead to cancer. When same lifestyle is followed it can create synergy and make cancer formation quicker	Bogdanova, N., Helbig, S., & Dörk, T. (2013). [95]
96	Connecting customers and telemedicine	Advanced telemedicine's can create things communication faster in the field of medicine	Chen, S., Cheng, A., & Mehta, K. (2013) [96]
97	Confidentiality of treatment and data base	Confidentiality in the treatment is essential. All customers need to be coded and only codes should be circulated	Simon, G. et.al., (2000) [97]
98	Making people aware by spreading the data base of multiple reports	Multiple reports across countries can be correlated and made to change for connecting things faster	Demirguc-Kunt, et.al., (2018) [98]
99	Reports of patients using scheduled drugs for cancer treatment	Certain drugs are proven based on the tests that are conducted. Hence these reports need to be taken care	Absolom, K., Holch, P., Warrington, L., Samy, F., et.al., (2017) [99]
100	Exercise and data base of patients	Past experience is the key to development and past data is essential for success	Courneya, K. S. (2003). [100]
101	ABCD analysis	Conceptual analysis engaging advantage, benefit, constraint and disadvantage in analyzing Breast cancer	Aithal, P. S. (2017). [101]

Source: Author's own

## 5. IDENTIFIED ISSUES IN BREAST CANCER DETECTION THROUGH ARTIFICIAL INTELLIGENCE:





**Fig No: 2 Breast Cancer Prevention, Detection and Treatment monitoring system**

**Source: Author's Own**

It is increasing and detection is a challenge hence, AI can come to the rescue. AI is used in the world of medicine in a big way, for example robotic surgery, designing of various tools for medical surgery. AI can create patterns for detection how terms of making things easier based on location. Location of patients in a cluster can reveal the spread of cancer of the breast. The identified issues in every field cancer, is as follows:

1. Detection is a challenges and educating women is the key to over come this challenge
2. Oncologists are expensive and less in numbers. The field of radiology for scanning and detection is expensive. Medical and technological break-through are essential to over come this challenge.
3. Critical stages like the last stage patient needs to be given palliative care and better hospice. The facilities are limited to few places in India and hence it should be developed in multiple locations in India.
4. Men too are detected with breast cancer due to various reasons and they too need surgery of the breast.
5. Breast is a symbol of nourishment, food and love to a child. Women are identified with their shape and genetic design. The removal of breast due to metastases will create deformity. New technologies and new materials need to be identified to replace the same shape and size for the breast that the women had before.
6. Primary health centers need to have a process of screening of all women above 40 years of age and PSI tests need to be conducted on large number of people, which is challenge due to cost and laboratory facilities

**6.IDEAL SOLUTION AND PRESENT STATUS:** The ideal solutions are strong testing and a centralized testing. All labs should be allowed to do breast cancer detection and response. Labs all over India needs to be connected with a central computer center controlled by one central government agency via national informatics center. The central command of the information will lead to finding out common factors in the entire process. All rural places too need to be connected to the central command.

**7.RESEARCH GAP:** The gap in cancer research is to find out commonality and application of science to detect the gene which is responsible for genetic transfer to the next generation. The faulty DNA has to be identified and highlighted for faster detection. The research gaps are as follows:

1. Data of genetic information and DNA studies to be made national
2. Data of deaths due to breast cancer needs to be made national
3. Technology and development of "Testing tools" to be created at a faster pace
4. Data of life style, profession and work environment is also not exactly known.

## **8.SUMMARY OF BREAST CANCER DETECTION BASED ON LITERATURE REVIEW:**

Breast cancer can create an economic loss to a family. When many families are affected this affects the society. A society can feel the impact when it comes to economic productivity. Economic productivity is based on capacity and ability to make things happen by both men and women. Every family has a mother and mother is the base foundation for the success of a family. Insurance can reduce the economic burden. Insurance cannot replace a



person. Every person needs to have medical policy. This policy can bring in little relief as it can help economically to pay for Radio therapy or Barchytherapy as per the need of the patient. These procedures can make a difference in the relief of the pain. Pain can-not be reduced by pain killers. It needs to be treated with proper medication.

Radiation therapy, chemo therapy, immune therapy, harmon therapy, targeted therapy, stem cell therapy are various therapies, that can change a patients future if followed as per need of the stage of cancer.

**Table No: 2 Summary of Literature Review**

Slno	Group	Breast Cancer treatment and determinants	Reference
1	Neural link and cancer treatment	Neural link can rescue many people as nano detection machines can be implanted inside the body to detect	Fiani, B & Cline, D. D. (2021). [64]
2	Computers aided design to detect	Better designs to make better tools and processes	Jiang, Y., & Doi, K. (1999). [65]
3	Artificial intelligence	Has made things easier and faster in analyzing data	Shah, S. et.al.,(2022) [66]
4	Cancer detection software	Better, new and faster cancer detection needed	Becker, A. S.et.al., (2017) [67]
5	Post operation and breast cancer	Post operation women needs care and rest	Marta, G. N.et.al.,(2020). [68]
6	Prevention of after effects of breast cancer	Using information technology and advanced gadgets we need to prevent breast cancer	De Cicco, et.al., (2019). [69]
7	Making women aware of things not be exposed to radiation	AI should allow us to learn about radiation in various forms. It should help us in tracking radiation	Alawad, S., & Abujamea, A. (2021). [70]
8	Making people aware by spreading the data base of multiple reports	Multiple reports across countries can be correlated and made to change for connecting things faster	Demirguc-Kunt, et.al., (2018) [98]
9	Reports of patients using scheduled drugs for cancer treatment	Certain drugs are proven based on the tests that are conducted. Hence these reports need to be taken care	Absolom, K.,et.al., (2017) [99]
10	Exercise and data base of patients	Past experience is the key to development and past data is essential for success	Courneya, K. S. (2003). [100]

Source: Author's Own

Cancer needs treatment and it can change when certain herbs like Turmeric has been found to be effective in reducing inflammation and prevention of cancer. Doses and quantities are exactly not known in bringing down the cancer cells.

## 9. RESEARCH AGENDA FOR APPLICATION OF ARTIFICIAL INTELLIGENCE FOR BREAST CANCER DETECTION AND CURE

Detecting cancer is the key to development and progress for solving wicked process that a family needs to solve. When cancer is detected and in women, either breast cancer or any other cancer one need to take steps very cautiously to handle the situation. As the treatment is set, it has its own effects on the whole body. The entire body experiences chemical changes and challenges. It results in hair fall, it may also result in to changes in skin colour and many more. Hence data plays a vital role in solving such roles. Data of the patient like weight, height, changes in B.P, changes in sugar levels etc.

Happiness is the key to solve problems. Measuring happiness is very difficult as there are no machines to measure happiness. Machines are also not there to measure anger, jealousy, greed or negative emotions. Emotions play a role in the progress of a well being of a cancer patient. Medicines react in a patient or respond in a patient's body or vice versa. Medicines have an effect on the psyche of a patient. Good medicines coupled with a positive state of mind can change a lot.

Measurement of Acidity in the body is difficult and there are no measuring instruments to find out acidity levels in a human body. Acidity leads to bone grinding or migraine or even make cancer cells to thrive and grow, also it is very difficult to exactly pin point and say that acidity or hyper acidity is the culprit; as we do not have accurate tools to measure acidity in a body. Acidity can lead to major changes in the metabolism of a patient. Research in this direction is lacking.

People have their own problems and the mind starts spinning the blood at a faster pace when they are in stress. The body feels that there is a threat or an attack on us, hence more we feel threatened the more they experience stress and release protection chemicals or exit strategies. This is complicated and difficult to assess.

However it is to note that when Sunflower oil is cooked or heated at high temperature can lead to release of Aldehyde. Aldehyde can cause cancer. Sunflower oil is the key to Russia and Ukraine's business. As large scale sunflower crops are grown in thousands of acres in Russia and Ukraine. The Sunflower is known to attract Radiation from Nuclear fuels, from Nuclear experiments conducted in Russia and Ukraine is spread across thousands of acres in vast open lands. This sunflower oil is exported in extremely large quantities to India. Sunflower oil when heated to certain temperature can release aldehyde in large quantities.

Coconut oil has been recommended for ages and has no cancer causing elements. As there is a sudden change shift towards sunflower oil, consumption it has increased cancer occurrence reports.

### **Application of artificial intelligence in generating research agenda:**

Data plays a pivotal role in applying artificial intelligence. Data related to food habits, life style habits, discipline habits are crucial and are to be added to family history, profession and

## 10. FINAL RESEARCH PROPOSAL FOR BREAST CANCER WITH NEURAL NETWORK AND ARTIFICIAL INTELLIGENCE:

**Title:** An In-dept analysis of Occurrence Detection and Prevention of with the help of Neural Networks, Artificial human intelligence and Data Science.

**Purpose:** To know what how to bring down deaths due to Breast cancer

**Research and investigative objectives:** Preference from traditional cancer treatments to data based treatments to detect cancer in general

**Proposed methodology:** Data collection information collection on the current AI applications

**Sample populations:** The population would be Mangalore city and all age groups of people

**Study samples:** Working individuals, businessmen, businesswomen, students, self employed

**Study instruments:** A questionnaire would be used and data would be collected by conducting a test of fitness before the actual survey begins

**Study procedures:** Individuals opinions and data would be collected using structured as well as semi structured interviews, both in local languages as well as English

**Examination and explanation from the learning:** The Examination of this study would be given to Medical doctors and Medical staff for them to implement and understand such methods

**Consequences and answers from this learning:** Latest adoption can be taken care of by all Hospitals and bring additional apps for various products. This can catapult detection, prevention and treatment tremendously.

**Conclusion and implementations from this learning:** Observations, suggestions can be implemented for the better progression of the cancer hospitals

**Lmitations and constraints to this learning:** the survey area is limited to Mangalore city and city patients. The survey does not cover institutions and organizations other than medical industry.

**11.ABCD ANALYSIS:** Every aspect of life needs to be analysed for understanding how things can be materialized. Analysis will lead to clarity, when observed from various angles like advantages, benefits, challenges and disadvantages. It will give us an understanding how to solve things in life

**A-Advantages:** A research in this area will give advantage of succeeding in prevention, detection, A process can be scaled up based on this research for others

**B-Benefits:** It will benefit not only Indians but also all women of the world in general. It will save families from losing a mother or a sister or a wife.

**C-Constraints:** The constraints are difficulty in collecting data and other related things pertaining to breast cancer. Shy patients unable to express their pain will be a challenge to the researcher.

**D-Disadvantages:** Every time it is important to consider the data and from where is the data coming. Since this research is based on Primary and secondary data it needs to relevant and latest, else treatments can go in a wrong way.

## **12. OPINIONS AND THOOUHGTS TO IMPLEMENT RESEARCH ACTIVIES ACCORDING TO THE ABOVE PROPOSAL**

1. Information technology and artificial intelligence will play a pivotal role in solving every breast cancer patient. Digital chips inserted in a body should be taken up seriously, every complication needs to be addressed in the best manner as quickly as possible.

2. All Breast cancer patients' Data should be stored in a national portal where researchers should have access to real time data. Super computer and quantum computers can lead the way in detecting similarity in patients.

3. AI should reach Rural and urban should be trained equally to detect breast cancer at an early stage.

4. Mobile Vans for cancer detection needs to be developed, mobile vans should have all the facilities to find, probe and inform higher medical staff to once cancer symptoms are detected

5. Self help groups should make things easier for women in rural locations to communicate and exchange knowledge.

6. Data should be shared among people to create awareness and clarity on breast cancer

### 13. CONCLUSION:

Information technology and Artificial Intelligence play a role in solving medical diagnosis. Medical detection and diagnosis is a must for Breast cancer. Every patient is different as patients are heterogeneous and every time when a patient is detected with breast cancer they need solution. Language barrier, understanding barriers need to be overcome. Every time we make things happen we need to ensure it performs. We need to bring to every one's notice that we can change things in life. Breadth is life and breadth needs to be extended. Breadth can increase a person's potential of making things happen. A patient should live and Participation in medical check-ups is essential to make things happen.

AI chips and components that are going to be inserted need to taken out for data analytics. Chips that are inserted are to be removed to verify their accuracy and performance time to time.

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