

# Adolescent Breast Cancer: Early Detection and Prevention

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## ABSTRACT

Breast cancer is one of the most frequently diagnosed malignancy among adolescent girls, accounting for approximately 7% of breast cancer among all age groups<sup>2</sup>. Tumor in breast can be benign or malignant. Breast cancer in young patients is rare but more aggressive with higher intensity, advanced stages, and poor prognostic features. Women of any age group might suffer from breast cancer but apparently, young women are at more risk. Heredity is mainly the risk factor in young breast cancer patients. Other risk factors such as age, hormones, lifestyle and food habits also contribute to breast cancer. All of these risk factors if prevented at an early age can help prevent breast cancer. There are various methods to detect breast cancer with and without help of a health care facility. Simple procedure like breast self-examination can be performed at home. While, mammography is considered as the most effective clinical method for diagnosing breast cancer. The women who have familial history can be considered as risk group for initiation of breast cancer. Taking preventive measures and participating in screening of breast cancer is essential for early detection and prevention.

**Keywords:** breast cancer, adolescence, early detection, prevention

## INTRODUCTION

Health is a state in which a person is physically, mentally and socially stable and able to cope with all demands of daily life. Living a healthy life is being in a state of balance within oneself and environment.<sup>1</sup>

Cancer is a disease in which some of the body's immature cells grow vigorously and spread to other parts of the body. Cancer can start almost anywhere in the human body, which is made up of trillions of cells. Normally, human cells grow and multiply (through a process called cell division) to form new cells as the body needs them. When cells grow old or become damaged, they die, and new cells take their place.<sup>2</sup>

Sometimes this orderly process breaks down, and abnormal or damaged cells grow

and multiply when they should not. These cells join together and form tumors, which are lumps of tissue. Tumors can be cancerous (malignant) or not cancerous (benign). Cancerous tumors spread into, or invade, nearby tissues and can travel to distant places in the body to form new tumors (a process called metastasis). Many cancers form solid tumors, but cancers of the blood, such as leukemias, generally do not.<sup>3,5</sup>

Breast cancer is a type of cancer that starts in the breast. It can start in one or both breasts. It may start from lobules, ducts, nipples, fat and connective tissue, blood vessels and lymph vessels. It can be benign or malignant. Non-cancerous tumors do not grow outside the breast. They are not life

threatening, but, some of them can increase the chance of getting breast cancer.<sup>2,3,5</sup>

Breast cancer is the commonest cancer found in women and second most prevalent disease worldwide. Currently, 1 in 8 women are diagnosed of breast cancer. Global Cancer Observatory, a tool setup by World Health Organization (WHO) showed an increased incidence of breast cancer from 1.7 million in 2012 to 2.1 million in 2018. The prevalence of breast cancer has been increasing every year specially in developed countries among young adolescents. This can be prevented if detected at early phase i.e., adolescence. However, awareness regarding breast cancer is less among adolescents.<sup>1,2</sup>

Adolescence is the phase of life between childhood and adulthood, from ages 10 yrs to 19 yrs. It is a unique stage of human development and an important time for laying the foundations of good health. Adolescents experience rapid physical, cognitive and psychosocial growth. This affects how they feel, think, make decisions, and interact with the world around them.

Despite being thought of as a healthy stage of life, there is significant death, illness and injury in the adolescent years. Much of this is preventable or treatable. During this phase, adolescents establish patterns of behaviour – for instance, related to diet, physical activity, substance use, and sexual activity – that can protect their health and the health of others around them, or put their health at risk now and in the future. To grow and develop in good health, adolescents need information, including age-appropriate comprehensive sexuality education; opportunities to develop life skills; health services that are acceptable, equitable, appropriate and effective. They also need opportunities to meaningfully participate in the design and delivery of interventions to improve and maintain their health. Expanding such opportunities is key to respond to adolescents' specific needs and rights.<sup>6,8</sup>

During adolescence, the production of hormones estrogen and progesterone leads

to enlargement of breast buds in female. The adipose tissue and lactiferous ducts grow in response to estrogen, whereas, lobular growth and alveolar budding occurs in response to progesterone production. According to Tanner, Thelarche is the onset of secondary breast development which occurs in between 8-13 years. Complete breast development occurs in between 2-4 years after thelarche.<sup>2,6</sup>

According to global statistics, adolescents are more likely to develop breast cancer than older women to present unfavourable biology and advanced disease translating to poor survival. Among patients with early-stage breast cancer, adolescents and young adult are 39% more likely to lose their life as compared to older women. In addition, adolescents and young adult women are more likely to experience side effects from therapeutic regimen and psychosocial issues after diagnosis.<sup>10</sup>

In India, breast cancer falls in second after cervical cancer in terms of prevalence. Breast cancer is associated with general health of the female, age at menarche, lifestyle pattern and genetic makeup.<sup>3</sup> There are also many other factors associated with the occurrence and recurrence of breast cancer. It can occur at any age among reproductive age group (15-45 years). It can also occur in adolescents. Adolescence is a defining period for future. Globalization and its influence on lifestyle of adolescents have led to unhealthy lifestyle choices, such as increased intake of fast food, decreased intake of fruits and vegetables, sedentary behaviours. Lifestyle choices have long been recognized as risk factor for non-communicable disease such as breast cancer.<sup>1,5,10</sup>

Early identification and prompt treatment of breast cancer helps to treat the disease in earliest phase, when it is most treatable. The most common symptom of breast cancer is palpable lump or mass in the breast. If breast self examination is performed since early reproductive years, breast cancer can be prevented and treated at early stage. Screening of breast cancer is another

important factor. Test like mammogram, Ultrasound, MRI and biopsy can be performed in risk group in order to identify their cancer at an early stage. For screening purposes, a woman is considered to be at average risk if she doesn't have a personal history of breast cancer, a strong family history of breast cancer, or a genetic mutation known to increase risk of breast cancer (such as in a *BRCA* gene), and has not had chest radiation therapy before the age of 30.<sup>3,7</sup>

### **Epidemiology of breast cancer**

Globally breast cancer is the most frequently diagnosed cancer in women regardless of age. In comparison to older women, Adolescent and young women are more likely to have familial cancer pre disposition gene, larger breast tumors, unfavourable biological characteristics, distant metastatic disease at diagnosis and adverse outcome.<sup>5</sup>

The percentage of breast cancer increases rapidly among adolescents from 2% at age 20 to more than 40% by the age 40. The abrupt increase by the age 40 is attributable to routine mammography. Breast cancer incidence is similar among adolescent and young women in both developed and developing countries.<sup>3,5</sup>

India is facing a cancer epidemic. By 2020, 70% of the world's cancer cases will be in poor countries, India being fifth among those. The Indian Medical Council released an analysis on cancer reports among women in Delhi, Mumbai, Chennai and Bangalore from 1982 to 2005 showing that until 10 years ago, 10 per 100000 women got breast cancer compared with 23 per 100000 now. By 2020, Breast cancer is set to overtake cervical cancers the most common type of cancer among women in India.<sup>6,10</sup>

The risk factors of breast cancer can be obesity, unhealthy lifestyle and habits such as smoking, early menarche, excess intake of fast foods for a long period of time, repeated radiation exposure, low BMI, regular use of oral contraceptives, late menopause history in family and family

history of breast cancer. However, performing exercise regularly can reduce the risk of getting breast cancer. Result of a study with an objective of assessing risk factors of breast cancer suggests that among 125 women undertaken in the study, 15% women reported to have a positive family history of breast cancer, 13% had BMI in underweight range, 5% had been taking oral contraceptive pills and 11.4% have been exposed to radiation in their earlier life. these all factors made the women susceptible to breast cancer.<sup>7,13</sup>

Regarding fetal development, the risk of developing breast carcinoma can begin from the time of pregnancy. Environmental chemicals and poor nutrition may alter fetal developmental patterns such that the tissue is at higher risk of developing disease in later life. this encompasses prevalence of breast cancer among women. Maternal exposure to certain chemicals such as Dichlorodiphenyltrichloroethane (DDT) and Dioxin put the fetus at greater risk of developing breast cancer. Timing of environmental exposure is critical for developing risk. The pregnant mother should be protected from exposure to chemicals in order to protect both the mother and fetus.<sup>8,17</sup>

Breast disorder in adolescence is mostly benign in nature. Such disorders are various congenital abnormalities of breast (amastia, hypomastia, athelia), developmental disorder of breast (breast asymmetry, atrophy, hypoplasia, hypomastia, hypertrophy), infection and abscess of breast (mastitis, breast abscess), mastodynia, nipple discharge and various benign disease as well as breast malignancies ( Juvenile fibroadenoma, giant fibroadenoma, cystic breast disease, fibrocystic disease, cyst of montgomery, intraductal papilloma, mammary duct ectasia, phyllodes tumor, primary breast carcinoma, secondary and metastatic breast carcinoma) .<sup>2,14</sup>

A retrospective study was conducted at southern part of India to find out early preventive measures of breast cancer. where

age of the participants was 13-17 years. Out of 6000 participants, 145 (2.41%) were the sufferers of breast cancer. Among them stage I breast tumor was observed in 3.4%, stage II was observed in 33.7%, stage III in 46.2% and stage IV in 16.5% patients. This study has concluded that prevention and self diagnosis of breast cancer should be started at early age right from the beginning of menarche. Adolescent needs education about reproductive health in order to initiate the prevention strategies. Treatment method will be applied on the basis of cancer stage but education should be provided to teenagers in order to improve the survival of breast cancer.<sup>9,15</sup>

A case control study was conducted with an aim of studying the association between breast cancer and selected exposure variables. The study was conducted among 188 women, 94 cases and 94 controls all of age between 25 to 69 years. Results suggests that, breast cancer occurs a decade earlier in Indian women as compared with the women of developed countries and is a leading cause of mortality in developing countries like India.so, raising awareness about screening procedure and treatment of breast cancer can help reducing the mortality.<sup>5,8,36</sup>

Studies on cancer suggest that breast cancer cases represent more than 50% of the total cancer cases. Following breast cancer is thyroid cancer and Hodgkin's lymphoma. In India, 13.9 lakhs cases of cancer were estimated in 2020. Projections suggest that the incidence would increase by 13% to reach 15.7 lakhs cases by 2025. A report of breast cancer studies states that there are 1,62,468 new registered cases and 87,090 reported deaths due to breast cancer. The death records belongs mostly(>32%) to age 45 years and above but the sufferers and survivors belong to every age group including adults and adolescents.<sup>2,21,14</sup>

### **Breast cancer among adolescents**

In India, the prevalence of breast cancer among adolescents and young adults is comparatively lower than the other age

group but young age is a bad prognostic factor for the treatment of breast cancer. According to studies, young age is second most powerful risk factor for breast cancer. Therefore, early detection is important at age group 13 to 18.<sup>7,6</sup>

The risk factors of breast cancer can be **familial history**: early onset of breast cancer is especially common in women having BRCA 1 mutation, germline BRCA1, BRCA2, TP53 mutation are found in about 50%. Germline cancer pre disposition mutation are found in approximately 10% of all breast cancer patients. Another powerful risk factor which is **age**: the chances of developing breast cancer increase with advancing age when the women is exposed to breast cancer risk during childhood. Further risk factor includes **hormonal**: early menarche, continuous oral contraceptive use, anovulatory infertility, early primigravida. **Lifestyle and food habits**: plant based low energy density diet reduces the risk of adolescence breast cancer whereas excess intake of fast food and red meat increases the risk of getting breast cancer at premenopausal phase.<sup>5,12</sup>

A study was conducted on risk factors of breast cancer among patients attending the tertiary care hospital to determine the association between breast cancer and selected exposure variables and to identify risk factors for breast cancer. It was a hospital based case control study conducted at Manipal, Udupi district. A total of 188 participants were included in the study, 94 cases and 94 controls all of age between 25 to 69 years. the case and controls were matched by 2 years range. Non vegetarian diet was one of the most important risk factors. The study concluded that non vegetarian diet is an important factor that contributes to breast cancer.<sup>25,36</sup>

A case control study was conducted about dietary patterns, nutrition and risk of breast cancer with an objective of assessing the relationship between dietary patterns and risk of breast cancer among under 50 year women. All the women under 50 years age

with pathologically confirmed breast cancer between 2013 and 2015 were referred to oncology clinics and 408 under 50 women were referred to other outpatient clinics who were without breast cancer at time of the study and 2 years later, they were selected as control group. The data was collected by using periodical care form from the Health Ministry by using univariate and multivariate logistic regression. The results revealed that, the most powerful factor for breast cancer was fried foods; the odds ratio for consuming fried foods more than once a month for breast cancer was 4.5 (95% confidence interval, 2.1 to 9.4). A dose response model indicated that increasing vegetable and fruit consumption upto 90 servings per month decreased the odds of breast cancer, but consuming fried food more than 90 servings increased the risk. Thus, inadequate consumption of vegetables and more consumption of soft drink, fried food and sweets were identified as risk factor for breast cancer.<sup>37</sup>

An epidemiological study was conducted to investigate the association between Polycystic Ovarian Syndrome and Breast cancer. This meta-analysis was conducted to estimate the association between Polycystic Ovarian Syndrome and Breast Cancer risk. The data were independently extracted and analyzed using 95% odds ratio and confidence interval using random effects model. The association between PCOS and breast cancer risk in case control studies was 0.87 (95% confidence interval 0.44 to 1.31) and that of cohort studies was estimated 1.18 (95% confidence interval 0.93 to 1.43). The meta-analysis demonstrated that Polycystic Ovarian Syndrome does not increase the risk of breast cancer.<sup>19,38</sup>

A descriptive cross sectional study was done at Bangalore, India to find out the knowledge and perception of adolescent girls regarding breast cancer among 100 adolescent girls. Only 17.1% knew how to perform breast self examination, 6.17% had never performed one. Awareness regarding signs and symptoms of breast cancer is

crucial for prevention. Women of any age needs to know what are the danger signs that can lead to breast carcinoma. The study had a conclusion that women consider breast cancer screening important and it should be started at early age.<sup>6,7,22</sup>

### **Endocrinal and chemotherapeutic treatment**

Early-stage disease can be seen mostly in adolescents for which various endocrinal treatment can be provided. Meta analysis of clinical trials suggest that women under the age of 50 and above 50 years derive similar benefit from chemotherapy. For triple negative breast cancer, neoadjuvant chemotherapy is preferred. For HER2 positive breast cancer, 12 weeks of adjuvant paclitaxel- trastuzumab treatment can be provided. For estrogen receptor positive, HER2 negative breast cancer, neoadjuvant chemotherapy is indicated. Adjuvant endocrine therapy is the standard of care for hormone receptor positive breast cancer and it reduces the risk of recurrence by 50%. It is necessary to preserve fertility after treating breast cancer in adolescents and young women as breast cancer chemotherapy might cause pre mature ovarian failure. The women who wish to conceive should stop endocrine therapy at least 6 months before conceiving.<sup>10,5</sup>

### **Survival of adolescent breast cancer patients**

The quality of life of adolescent breast cancer survivors are reported frequently as compromised. The ones who have been receiving endocrine therapy experience pronounced symptoms related to estrogen depletion such as vaginal dryness, decreased sexual desire and fatigue. There is a decade long risk of cardiotoxicity and fracture. Introduction of chemotherapy at a young age might result in cognitive impairment. Also the adolescents who are survivors of breast cancer are at high risk of potentially serious psychosocial issues including depression, anxiety, sense of isolation, poor



body image and disruptions in personal relationship.<sup>10,11</sup>

The survivorship of breast cancer patients depends on early detection, prevention of complication and method of treatment. A coordinated multi-disciplinary team of medical professional are required for complete treatment and survival of the patient. The team includes physician, nurse, lab technician, pharmacist, psychologist, social workers, dietician, occupational therapist, trainer for meditation and exercise. This team approaches the patient not only for treatment but also for the art of living a healthy life after treatment.<sup>10</sup>

### **Screening and Breast self examination**

Screening is a technique used to find out signs and symptoms of disease in apparently healthy population. Many techniques have been developed till now that can be used to screen a person for specific type of cancer. The overall goals of breast cancer screening are to detect the cancer at an earlier stage of disease, to lower the mortality and morbidity from breast cancer and to identify the high risk group. Mammography is by far considered as the best technique for screening of breast cancer. There are three types of mammograms; film mammography which is a X-ray picture of breast, digital mammography which is a computerized picture of breast and Digital Breast Tomosynthesis which computer is used to make 3D pictures of breast. Other test can be Magnetic Resonance Imaging, clinical breast examination, breast self examination, thermography and cytology tests.<sup>31</sup>

Breast self examination is a multiple step process whereby a reproductive age women can detect presence of visible and palpable lumps on here breast. Also, through this examination we can find out if there is any infection which is exhibited through the abnormal discharge of nipple. It is performed every month within one week of completion of menstrual cycle. A stepwise procedure of inspection and palpation ends with squeezing of nipples.<sup>5,17,13</sup>

A cross sectional study was done among adolescent girls of age 16-19 years in a rural community by using a self administered questionnaire. The questions were all about breast self examination. The study concluded that 17.1% of the girls were aware about breast self examination, whereas 3.2% girls used to perform breast self examination on a regular basis. Source of knowledge about breast self examination was through hospital visit and health camps. This shows the importance of raising awareness about breast self examination. Adolescent girls are the future women. Thus, it is relatively important to aware them as it will help in early diagnosis and prompt treatment.<sup>6,20</sup>

### **CONCLUSION**

The study has collectively outlined that breast cancer is a complex form of many subsets of disease. While evaluating the genetic background, the root cause begins with menarche. As the age advances, body begins to manifest symptoms through stages. Symptoms become worsen with elevation of each stage. Evaluating the etiologies like biological, genetic and lifestyle along with food habits, it can be concluded that breast cancer can be prevented at an early age. Detection at early age through screening and breast self examination helps to treat the disease at early stage. This will reduce the mortality and morbidity which occurs due to breast cancer.

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