

Breast cancer in India today

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Introduction

Breast cancer is now the most common cancer in Indian women (25.8 per 100,000 and 25-32% of all female cancers) with a high mortality rate (12.7 per 100,000), due to late presentation (45.7% in advanced stage). In urban area, changing lifestyle and food habits may have contributed to this. In the rural areas breast cancer is diagnosed at an advanced stage due to lack of awareness, lack of population screening programs and facilities for early diagnosis and treatment. In some rural areas of India, cervical cancer is the commonest followed by breast cancer.⁽¹⁾

The incidence is increasing in young women (16% in 30 to 40 years and 28% in 40- 50 years age group), who present with larger tumors and with lymph node involvement. Triple negative cancer cases with a poor prognosis are high in India, and are common in young women.⁽²⁾ BRCA1/2 genetic mutations frequency in Indian breast cancer patients varies from 2.9-24%, with more of BRCA 1.⁽¹⁾

Breast is the target organ for the main steroids secreted by the ovary, particularly estradiol and progesterone. Hormones play a key role in the in the normal physiological development of the breast tissue. Sex steroids play a critical role in the etiology of breast cancer. Supporting evidence includes the known relationships between reproductive factors such as early age at menarche, nulliparity and late age at menopause.

Estrogens contribute to tumor growth by promoting the proliferation of cells with existing mutations or by increasing the opportunity for mutations that regulate the growth and differentiation of mammary cells which may play an important role in the development of breast cancer. Serum estrogen enters the cell by free diffusion. Its intracellular concentration is enhanced in those organs and tissues that express estrogen receptor (ERs). Breast tissue expresses estrogen receptors, so increase in serum estrogen leads to increase in estrogen levels in breast tissue and enhances breast tumor development.

Estrogen is also produced locally in breast tissue by the enzyme aromatase cytochrome 450 increases the chances of cancer by promoting tumor proliferation. Peripheral aromatase activity in estrogen synthesis, increases with age. A study conducted at our institute also showed higher circulating levels of serum estradiol in patients with breast tumors.⁽³⁾ Progesterone may either decrease breast cancer risk, by mitigating the estrogen induced proliferation of breast epithelial cells, or increase risk because of the higher breast cell

proliferation in the luteal phase when progesterone levels are the highest. Exogenous progestins have been shown to induce growth factors (EGF, TGF-), to stimulate the expression of the growth factors and growth factor receptor (EGFR) protein and its mRNA. They also increase the expression of protooncogenes. The expression of the tumor suppressor protein p53 is decreased. Testosterone increases the breast cancer risk either directly by increasing cellular growth and proliferation or indirectly by acting as a precursor to estradiol. It is converted to estradiol by the enzyme aromatase in the peripheral adipose tissues.

Environmental factors like polycyclic aromatic hydrocarbon (PAH) emission levels are very high in India. PAHs are stored in the fat tissue of breast and interact with cellular estrogen receptors.⁽¹⁾ Studies have also shown high estrogenic organochlorine pesticide levels (HCH and DDT) in estrogen positive breast cancers. DDT is known to be an estrogen, mimicking the action of estrogen.⁽³⁾ Given the high pollution levels and use of insecticides in our country, these modifiable environmental factors need to be studied further.

With increasing cases of breast cancer in urban and rural India the need of the hour is to have practical screening programs in place to reach out to the masses. Although the Government has announced promising screening programs⁽⁵⁾ it will still take a while to actually reach out. In the meanwhile we as medical personnel can start out in a small way to teach each lady who visits the hospital, simple self breast examination techniques and to report to the hospital or any nearby health care centre whenever she feels a lump. Vehicles equipped with sono mammography facilities with trained personnel should go out to the periphery where there is no easy access to healthcare or tie up with primary health care centres for mass screening of breast cancer. This can help detect breast cancer at an early stage and early interventions can help prolong many lives.

References

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