MINI-REVIEW

Breast Cancer in India: Where Do We Stand and Where Do We Go?

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Abstract

    This is a review article which looks into details what the actual scenario of the problem of breast cancer in our country is. As the problem is on the rise, what is the level of the preparedness at our end to tackle the problem. The articles reviews the epidemiology of breast, high risk factors, detection, diagnosis and treatment facilities also along with that screening facilities and their ground reality, awareness of the women from different walks regarding various issues of breast cancer and what intervention can be made to combat the disease.

Keywords: Breast cancer - challenges - India

Introduction

India with a population of 1.2 billion is the most populous democracy in the world. India is a pluralistic, multilingual, and multiethnic society. It includes over 15 native languages with more than 70 dialects (Government of India: Office of Registrar General, 2010). Although the focus of public health has been mostly on infectious diseases in the developing countries, non communicable disease like cancer also take an increased toll on resources (Parkin et al., 2001). Unlike other cancers, breast cancer is eminently treatable if detected at an early stage. However, there is a need for culturally appropriate breast cancer education and intervention strategies. With the Rs-10 billion Indian oncology market expected to grow at a rate of 21 per cent for the coming five years, dedicated oncology setups within hospitals are still in the pipeline to cater for 2.5 million cancer patients (Shukla, 2010).

Epidemiology of Breast Cancer in India

Although the incidence of breast cancer has increased globally over the last several decades (Hortobagyi, 2005; Anderson, 2008; Porter, 2008). the greatest increase has been in Asian countries (Green et al., 2008). In Asia, breast cancer incidence peaks among women in their forties (Agarwal et al., 2007), whereas in the United States and Europe, it peaks among women in their sixties. In India premenopausal patients constituting about 50% of all patients (Agarwal et al., 2007). It is expected that in the coming decades, these countries would account for majority of new breast cancer patients diagnosed globally. Over 100,000 new breast cancer patients are estimated to be diagnosed annually in India (Nandakumar, 1995; Agarwal et al., 2007). A study conducted by the Harvard School of Public Health revealed that 1.35 million cases of breast cancer would be diagnosed worldwide in 2009 accounting for 10.5% of new cancers, second only to lung cancer. Breast cancer cases are expected to increase by 26% by 2020 and most of these will be seen in developing countries (Anonymous, 2009).

Data from the International Agency for Research on Cancer (IARC) registry suggest that 45% of newly diagnosed cases of breast cancer and 55% of breast cancer-related mortality currently occur in low- and middle-income countries. IARC trends also show a 20-30% increase in the incidence of breast cancer in developing countries during the past decade (Curado et al., 2009). As per the ICMR-PBCR data, breast cancer is the commonest cancer among women in urban registries of Delhi, Mumbai, Ahmedabad, Kolkata, and Trivandrum where it constitutes >30% of all cancers in females (National Cancer Registry Programme, 2001). In the rural PBCR of Barshi, breast cancer is the second commonest cancer in women after cancer of the uterine cervix (National Cancer Registry Programme, 2001). The age standardized incidence rates (AARs) range from 6.2-39.5 per 100,000 Indian women. The AARs vary from region, ethnicity, religion, with the highest incidence reported at 48.3 per 100,000 women in the Parsi community of Mumbai (National Cancer Registry Programme, 2001).

The incidence of this disease has been consistently increasing, and it is estimated it has risen by 50% between 1965 and 1985 (Saxena et al., 2002). The rise in incidence of 0.5-2% per annum has been seen across all regions of India and in all age groups but more so in the younger age groups (<45 years) (Murthy et al., 2007). More than 80% of Indian patients are younger than 60 years of age. The average age of patients in 6 hospital-based cancer registries ranged from 44.2 years in Dibrugarh, 46.8 years in Delhi,

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47 years in Jaipur, to 49.6 years in Bangalore and Chennai. The average age of breast cancer patients has been reported to be 50-53years in various population-based studies done in different parts of the country (National Cancer Registry Programme, 2001). A significant proportion of Indian breast cancer patients are younger than 35 years of age. This proportion varies between 11% at Tata Memorial Hospital, Mumbai (Dinshaw, 2006) to 26% at SGPGIMS, Luck now (Agarwal et al., 2007). Young age has been associated with larger tumour size, higher number of metastatic lymph nodes, poorer tumour grade, low rates of hormone receptor-positive status, earlier and more frequent loco regional recurrences, and poorer overall survival (Shavers, 2003; Mathew et al., 2004). There is a significant difference in the survival rates in developed and developing countries mainly because of a lack of early detection programmes and inadequate resources for treatment. Coleman reported >80% survival from breast cancer in North America and Europe compared with 60% in middle-income countries and 40% in low-income countries (Coleman et al., 2008).

High risk factors: Much of the increase of breast cancer in India has been associated with greater urbanization and changing life styles. In a study on risk factors for breast cancer among women attending a tertiary care hospital in southern India, the population was predominantly from a rural background which sustained on agriculture. This revealed the fact that this disease is no longer confined to an urban setting. However, despite the rural status, women in this study were literate and nearly 25% were employed which probably explains the increased risk (Prince et al., 2010). Higher education level and income are shown to be significant reasons for an increased risk (Singh et al., 1999; Tavani, 1999). This is because economic independence may encourage women to remain single or marry late thereby increasing their risk of getting the disease (15.9%). There was no difference between cases and controls with respect to physical activity in terms of regular fitness regimen as only 3% in both the groups were involved in it. However, 96.4% of the controls engaged in rigorous household activity whereas only 84% of the cases did so. This suggests that the controls had a more physically active life when we consider rigorous house work to be a form of physical activity. It was observed that urban women were more obese and had relatively larger body size in the early years of life. A positive association was observed between breast cancer risk and augmented anthropometric factors for both pre- and post-menopausal rural and urban women. The study supports the hypotheses that increased anthropometric measures are important determinants of breast cancer in India, although they do not appear to contribute appreciably to the urban–urban breast cancer differences (Mathew et al., 2008). A case control study conducted in Mumbai indicated that compared to married women, single women had a 4-5-fold higher risk for developing breast cancer in the age group of 40-54 and above (Paymaster et al., 1972). In another study, nulliparous women had a 2.2-fold higher risk than parous women (Rao et al., 1994). In Mumbai, breast cancer incidence rates are highest among Parsis

and Christians and lowest among Jains and Buddhists. The possible reasons for high breast cancer incidence in the Parsi community are their westernized lifestyle, consanguineous marriages, and late age of marriage and childbirth (Paymaster et al., 1970). In another study in Chennai, rates were highest in Christians followed by Hindus and Muslims (Nair et al., 1993). Similar results have been reported from a study performed in the South Indian city of Thiruvananthapuram (Nair et al., 1993). In an Indian study on 226 breast cancer patients, 20.7% had a positive family history (Saxena et al., 2005). On the contrary, numerous other studies have reported a low rate of familial pattern of breast cancer in Indian patients. This is particularly interesting given the relatively young age of Indian breast cancer patients. At SGPGIMS Luck now, only about 5% of all patients managed had a definite family history of breast and/or ovarian cancer in first degree relatives, similar to the figures available from other Indian centres (Agarwal, 2008). Genetic screening/ diagnosis is not routinely performed in most Indian centre due to paucity of funds and facilities. As a result, there is scarce data on the genetic composition and BRCA1/2 mutations in Indian patients. Thus, the results of this initial study suggest that the mutation spectrum and prevalence of BRCA1 and BRCA2 in the Indian population may differ from what has been observed in other populations. Earlier age at menarche i.e. at or before 12 years and the women who had first full term delivery after 25 years of age were found to be at higher risk than women who had first child before 20 years of age. Nulliparous women were at higher risk than parous women. The risk decreases as parity increases. A case-control study carried out in Chennai showed that single women compared to married women had 4-5 fold higher risk for development of breast cancer in the age group of 40-54 years and 55 and above.

Breast-feeding is a common practice In India. The risk was found to be more among nulliparous because of lack of breast-feeding practices. In a multicenter case control study by Gajalakshmi et al. on breast feeding and breast cancer risk in India revealed that lifetime duration of breast feeding was inversely associated with breast cancer risk among premenopausal women and no such protective effect was demonstrated in the post menopausal women (Gajalakshmi et al., 2009).In another case control study conducted at a government medical college at Nagpur, lack of or less duration of breast feeding was associated with the risk of breast cancer (Meshram et al., 2009). Mothers who did not breastfeed in their lifetime were at higher risk than those who had breast-fed their children. (O.R.=1.71, CI=0.54-5.35, P<0.001). Total duration of breast-feeding is also important. As the total duration of breast-feeding increases, risk of breast cancer decreases. In the same study it was observed that the risk of breast cancer was more for women who had menopause after 50 years compared to women who had menopause before 45 years of age (Meshram et al., 2009).

Receptor Status

Recent reports from India and Pakistan suggest an important increase in the incidence of breast cancer and

specifically ER, PR negative breast cancer among these populations. ER, PR negative breast cancer, of which 50% is also Her2Neu receptor negative (triple negative), is biologically aggressive, resistant to conventional cytotoxic chemotherapy treatment, and is associated with reduced survival compared to other subtypes of breast cancer (Kakarala et al., 2010). Estrogen (ER) and progesterone receptors (PR) are found positive in only 20-45% of Indian patients. ER-positive rates were reported to be lower in Indian patients than those in western countries. Not all patients in India undergo hormonal receptor testing as evident from the study in Delhi which showed only 35.5% of patients had receptor testing (Raina et al., 2005). At TMH Mumbai, the ER+ status was found in 33%, and PR+ in 46% of patients (Desai et al., 2000). According to some, the low ER+ and PR+ status in Indian patients may actually be due to improper immune staining techniques used. A study from a major hospital in Mumbai reported that the ER–/PR+ reported on IHC were actually due to suboptimal manual assays, and when the same tumors were evaluated using well standardized international kits, they were found ER+/PR+ (Navani et al., 2005).

Detection, Diagnosis and Treatment

Although breast cancer can be detected at earlier stages by simple breast examination, maximum (>90%) cases are diagnosed in advance stages i.e. stage II, III and stage IV (Meshram et al., 2009). In Africa and Asia the treatment of breast cancer in stages I, II or III costs less than U$ 390 per Disability Adjusted Life Years (DALY) averted. If the cancer progresses to stage IV treatment will cost more than 3,500U$ per DALY averted (Groot et al., 2006). Breast cancer treatment in India varies from non existent, to the most updated at power with the developed world. Breast cancer is treated using 3 main modalities: surgery, systemic therapy and radiotherapy.

Surgery

The majority of patients with breast cancer in developing countries are managed by general surgeons. Surgical subspecialties dealing with breast cancer such as surgical oncology and breast surgery are still evolving. Inappropriate surgical management of breast cancer is common at the community level. This takes the form of indiscriminate diagnostic lumpectomy, incomplete mastectomy and omission of or suboptimal axillary lymph node clearance. All these factors can adversely affect the prognosis of these patients (Deo, 2010). A large proportion of Indian patients are treated with inadequate/inappropriate initial surgical procedures before they are seen and managed by specialists. In a study from a major North Indian teaching hospital, almost 75% of the patients referred for management of operable early breast cancers (EBC) had had an incision or excision biopsy not intended for treatment of breast cancer (Tewari et al., 2006). At SGPGIMS Lucknow,the picture is more or less the same, and about 40% patients with EBC or locally advanced breast cancers present after some sort of surgical procedure which was either not intended to be a breast cancer treatment procedure or was inadequate. Here very

few patients actually opt for reconstructive surgery for the breast and that is a skill with which breast surgeons need to get familiar.

Radiotherapy

This has an important role in the treatment of breast cancer at every stage. With appropriate treatment, many women are cured of breast cancer, while many others live longer with the disease and have a better quality of life. International guidelines recommend one megavoltage therapy equipment for every 120,000 population (Ravichandran, 2009). However, the current radiation oncology infrastructure in most developing countries remains grossly inadequate. In India for a population of about 1100 million, 1155 radiotherapy machines are required to cater to all cancer patients but at present there are only about 400 teletherapy machines, located in large cities only. drrajiv sarin,actrec,mumbai (Rajiv, 2009).

Chemotherapy

It is estimated that presently around 160 Government hospitals and more than 350 private hospitals in India are providing specialized oncology treatment. A very small percentage amongst these hospitals provides all three areas of oncology namely surgical, medical and radiation oncology. Close to 25 regional cancer centers (RCC) have been established in the country for the ongoing care and early detection of the disease. More than 35 major players are operating in the Indian cancer treatment market and close to 15 MNCs are already present and more are planning to enter the market. Still, there are very few exclusive hospitals dedicated to cancer care. Apart from the regional cancer centers, which are owned by the Government of India, the number of providers in the private sector is small. There are numerous private clinics operated by oncologists for chemotherapy, which is a very fragmented sector due to the size of the country and the preference for localized treatment because of cost considerations (Sonal, 2010).

Presently, more than 90% of patients with breast cancer require either chemotherapy or hormonal therapy. Most of the recently launched anti breast cancer agents are expensive and beyond the reach of most patients with breast cancer in developing countries (WHO, 2008). It has been found by the WHO that in low and middle income countries up to 90% of the population pay for medicine out of their own pocket due to lack of social insurance and inadequately publicly subsidized services (WHO, 2008). The Essential Drug List in India does not have even a single life saving cancer drug on its list, despite cancer being a part of national disease control programme. Epirubicine hydrochloride used for the treatment of breast cancer is sold for Rs 2,000 for 50 mg vial. The required dosage in patients is usually about 100-120 mg every 21 days for 6 cycles. The cost of treatment for the patient would be minimum of about Rs24,000. Another medicine, docetaxel, is required to be taken in about 75 mg dose. However it costs about Rs11,915 to about Rs7,500/ for an 80 mg vial. The difference in the price is more than Rs4,400/- between generic manufacturer with the lowest rate and the one with the highest price. Another drug,

letrozole used for treatment of advanced breast cancer in post menopausal women is being sold at Rs5,445 for 2.5 mg 30 tabs, whereas the other generic manufacturer are selling it at Rs540/-.The treatment requires one tab to be taken every day for 5 years. The treatment would cost the patient about Rs326,700/-, whereas at the price sold by the generic manufacturers it would cost a patient only Rs32,400.Trastuzumab is being imported and is priced at Rs1,35,200 per vial of 450 mg which is required to be taken for 52 weeks, which is clearly out of the reach of most patients. Reasons for high prices of cancer treatment medicine are primarily due to lack generic competition, or that the suppliers of generic medicines place the prices slightly below the brand medicine prices, or that there is high profit margins in manufacturing, or high government taxes and duties, or inefficient supply or high wholesale or retail mark-ups (WHO, 2008). According to Kingsbury, half of Indian women with breast cancer go entirely without treatment (Kingsbury, 2008).

Screening

Estimate of the cost-effectiveness of breast cancer screening in India compares favourably with estimates of cost-effectiveness of breast cancer screening in Western countries. It is estimated that in India it costs Int.$1341 per life year gained to screen women aged 40-60 with biennial CBE and Int.$3468 per life year gained with biennial mammography (Quirine et al., 2003). In India, screening from age 40-60 was more cost-effective than screening from age 50-70 due to the young age of the population, the low life expectancy (62 years), and the young age at which the peak incidence is reached. Results indicate that every-5-year, biennial, and annual CBE for women aged 40-60 all lead to considerable reductions in mortality and high numbers of life years gained. Biennial screening with mammography led to higher reductions in mortality in simulation study and saved more life years, but at high incremental costs. The choice of the most appropriate screening policy for India will depend largely on the amount that health authorities are willing or able to pay. Although it is established that screening by Mammography can substantially reduce mortality from breast cancer, especially in women over the age of 50 years. Breast cancer screening programs involving imaging techniques are expensive and for this reason cannot be adopted in developing countries as a routine public heath measure. Economic constraints of Mammography apart, compared to the west, a relatively large proportion of breast cancers in India occur in younger women (reflecting not only a younger age structure of the Indian population but also the observation of lower risk in post-menopausal women as compared to that in western women). Published studies suggest that Mammographic Tata Memorial Hospital has been involved in a randomized controlled trial (n=150,000) which compares the efficacy of health education and clinical breast examination (CBE) provided by trained primary health care workers with just health education provided by the same workers in women aged 30-6 years living in the slums of Mumbai. This study has now entered its 6th year and 3rd round of screening. The

study already shows a good compliance-to screening rate (70%) and down staging is already evident. The principal objectives of the study i.e. demonstration of a reduction in incidence and mortality will however become evident only after another 10-15 years (Dinshaw et al., 2005).

Awareness: In developing countries lack of public awareness about breast cancer means that patients ignore their symptoms till the very late stage. Only 36% of the teachers had heard the term breast self examination. Teachers knew little about when and how to perform a breast self exam. Only 13.37% knew that the correct frequency of doing it was once a month. Some 7.2% knew about the position in which it should be done and only 1.36% participants were aware of the right time of doing it i.e. for those women who menstruate, a week from the start of periods and for those women who do not menstruate one a fixed date every month. This dismal awareness level was reflected in practice as none had ever practiced BSE (Khokhar, 2009). Also none of the participants went for regular Clinical Breast Examination (CBE) and mammogram. In another study on working women, out of 424 participants only 2 had ever done a breast self exam and others had never attempted doing it. However with the sending of sms reminders and conducting training programme the compliance improved (Khokhar, 2010). In another study conducted in urban area of Delhi, only 56% women were aware of breast cancer; among them, 51% knew about at least one of the signs/symptoms, 53% were aware that breast cancer can be detected early, and only 35% mentioned about risk factors (Somdatta et al., 2008). Interestingly of the low proportion of women 56/342 (16.4%), who claimed to be familiar with BSE none of them had ever practiced it; 6/342 (11%) had received some form of training from a local NGO and the rest had sourced their knowledge from either the television or the print media (Rao, 2005). In rural Kashmir only 4% of the women had received any training or education about the purpose and technique of breast self exam (Dallas et al., 2011).Since self detection remains a key method of breast cancer through the world even now, it is logical that the women in India should be made breast aware (Mara, 2010).

Interventions for the Future

1) Government agencies, non government organizations and the media can play a major role in increasing awareness about breast cancer among the general public. It should be ensured that awareness campaigns are in regional languages to have a better penetration. Awareness about breast feeding and its protective effects also needs to be imparted to decrease the risk of breast cancer. If local celebrities can be involved to promote the cause it will further strengthen the awareness activities.

2) There is also a need to strengthen the cancer-related curriculum in medical schools, focusing on breast awareness and screening methods. Also breast lump protocols made management will go a long way in avoiding mismanagement of patients with cancer at primary and secondary healthcare facilities.

3) Women in late thirties should be the target for the

purpose of screening in India as breast cancer is occurring in younger age group over here.

4) Public health workers can be trained in Clinical Breast Examination to reach out to the length and width of this huge country.

5) Programmes should be devised for surgeons to train them in the appropriate surgical management and referral. Continued medical education can help in training the general surgeons in basic skills of breast surgery.

6) Guidelines for breast cancer management have been developed for the developed countries.India is a limited resource country and within the country also there are many cultural, social and health infrastructure differences therefore we should form our own management guidelines which are feasible and practical.

7) Regulation of the cost of chemotherapy drugs by the regulatory agencies is of utmost relevance in providing complete treatment to the patients.

8) Research into genetic makeup of breast cancer in India is limited. If undertaken it may help us understand the early onset of breast cancer in India.

9) Mobile mammography units to target women in the interior of the country, villages, hilly areas etc.

References

Agarwal G, Pradeep PV, Aggarwal V, Yip CH, Cheung PS (2007). Spectrum of breast cancer in Asian women. *World J Surg*, **31**, 1031-40.

Anderson BO, Jakesz R (2008). Breast cancer issues in developing countries: an overview of the breast health global initiative. *World J Surg*, **32**, 2579-85.

Anonymous (2009). Breast cancer in developing countries. *Lancet*, **374**, 1567.

Coleman MP, Quaresma M, Berrino F, et al (2008). Cancer survival in five continents: a worldwide population-based study (CONCORD). *Lancet Oncol*, **9**, 730-56.

Curado MP, Edwards B, Shin HR, et al (2007). Cancer incidence in five continents,Vol. IX. Lyon: International Agency for Research on Cancer; 2007 (IARC Scientific Publication no. 160). Available at http://www-dep.iarc.fr/ (accessed on 27 December 2009).

Dallas PE, Deborah OE, Gregorg C, et al (2011). Challenges and implications of women's breast health initiative in rural Kashmir. *The Breast*, **20**, 546-50.

Deo SVS (2010). Challenges in the treatment of breast cancer in developing countries. *Nat Med J India*, **3**, 129-31.

Desai SB, Moonim MT, Gill AK, et al (2000). Hormone receptor status of breast cancer in India: a study of 798 tumors. *Breast*, **9**, 267-70.

Dinshaw KA, Sarin R, Budrukkar AN, et al (2006). Safety and feasibility of breast conservingtherapy in Indian women: two decades of experienceat Tata Memorial Hospital. *J Surg Oncol*, **94**, 105-13.

Dinshaw KA, Shastri SS, Patil SS (2005). Cancer Control Programme in India:Challenges for the new millenium. *Hlth Adm*. **1052**, 10.

Gaurav A, Pooja R (2008). Breast cancer care in India: The current scenario andthe challenges for the future breast care. *Breast Cancer Care in India*, **3**, 21-7.

Gajalakshmi V, Mathew A, Brennan P, et al (2009). Breast feeding and breast cancer risk in India: a multicenter case-control study. *Int J Cancer*, **125**, 662-5.

Government of India, Ministry of Home Affairs, Office of the Registrar General and Census Commissioner, India http://www.censusindia.gov.in/.(accessed 01.17.10).

Green M, Raina V (2008). Epidemiology, screening and diagnosis of breast cancer in the Asia–Pacific region: current perspectives and important considerations. *Asia Pac J Clin Oncol*, **4**, 5-13.

Groot MT, Baltussen R, Uyl-de Groot CA, Anderson BO, Hortobágyi GN (2006). Costs and health effects of breastcancer interventions in epidemiologically different regionsofAfrica, North America, and Asia. *Breast J*, **12**,81-90.

Hortobagyi GN, Garza SJ, Pritchard K, et al (2005). The global breast cancer burden: variations in epidemiology and survival. *Clin Breast Cancer*, **6**, 391-401.

Kakarala M, Rozek L, Cote M, Liyanage S, Brenner DE (2010). Breast cancer histology and receptor status characterization in Asian Indian and Pakistani women in the U.S.-a SEER analysis. *BMC Cancer*, **10**, 191.

Kingsbury K (2007). Global breast cancer: the changing face of breast cancer. Time Specials. http://www.time.com/time/specials/2007/article/0,28804,1666089_1666563,00.html.

Khokhar A (2008). Reminder system for making working women from delhi breast aware. *Indian J Med Informatics*, **5**, 1-47.

Khokhar A (2009). Level of awareness regarding breast cancer and its screening amongst Indiant eachers. *Asian Pac J Cancer Prev*, **10**, 247-50.

Parkin DM, Brey F, Ferlay J, Pisani P (2000). Estimating the world cancer burden: globocan. *Int Jo Cancer*, **94**, 153-6.

Porter P (2008). Westernizing women's risks? Breast cancer in lower-income countries. *N Engl J Med*, **358**, 213-6.

Mathew A, Gajalakshmi V, Rajan B, et al (2008). Anthropometric factors and breast cancer risk among urban and rural women in South India: a multicentric case–control study. *Br J Cancer*, **8**, 207-13.

Mathew A, Pandey M, Rajan B (2004). Do younger women with non-metastatic and non-inflammatory breast carcinoma have poor prognosis? *World J Surg Oncol*, **2**, 2.

Mara YR, Joann GE, Joyce P, et al (2010). Miglioretti self-detection remains a key method of breast cancer detection for US. *Women J Women's Hlth*, **20**, 1135-9.

Meshram II, Hiwarkar PA, Kulkarni PN (2009). Reproductive risk factors for breast cancer: a case control study online. *J Hlth Allied Scs*, **8**, 5

Murthy NS, Agarwal UK, Chaudhry K, Saxena S (2007). A study on time trends in incidence of breast cancer –Indian scenario. *Eur J Cancer Care*, **16**, 185-6.

Nair MK, Sankaranarayanan R, Nair KS, et al (1993). Overallsurvival from breast cancer in Kerala, India, inrelation to menstrual, reproductive, and clinical factors. *Cancer*, **71**, 1791-6.

Nandakumar A, Anantha N, Venugopal TC, et al (1995). Survivalin breast cancer: a population-based study in Bangalore, India. *Int J Cancer*, **60**, 593-6.

National Cancer Registry Programme: Consolidated report of the population based cancer registries 1990-1996. Indian Council of Medical Research, New Delhi, 2001.

Navani S, Bhaduri AS(2005). High incidence of oestrogenreceptor negative progesterone receptor positive phenotype in Indian breast cancer: fact or fiction? *Indian J Pathol Microbiol*,**48**, 199-201.

Paymaster TC, Gangadharan P (1970). Cancer in parsicommunity of Bombay. *Int J Cancer*, **5**, 426-31.

Paymaster JC, Gangadharan P (1972). Some observations on the epidemiology of cancer of breast in women in western India. *Int J Cancer*, **10**, 443-50.

Prince AH, Kavitha S, Binu VS, MS Vidyasagar, Suma N (2010).

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Risk factors for breast cancer among women attending a tertiary care hospital in southern. *J Collaborative Res Int Med & Public Hlth*, **2**, 109-16.

Quirine LO, Gerrit D, Arno der Kinderen, et al (2800). Breast cancer screening policies in developing countries: a cost-effectiveness analysis for India. *J Natl Cancer Inst*, **100**, 1290-300.

Raina V, Bhutani M, Bedi R, et al (2005). Clinical features and prognostic factors of early breast cancerat a major cancer center in North India. *Indian J Cancer*, **42**, 40-5.

Rao DN, Ganesh B, Desai PB (1994). Role of reproductive factors in breast cancer in a low-risk area: acase-control study. *Br J Cancer*, **70**, 129-32.

Rao RSP, Suma N, Nair NS (2005). Kamath Acceptability and effectiveness of a breast health awareness programme for rural women in India. *Indian J Med Sci*, **59**, 9.

Ravichandran R(2009). Has the time come for doing away with Cobalt-60 teletherapy for cancer treatments? *J Med Phys*, **34**, 63-5.

Saxena S, Rekhi B, Bansal A, et al (2005). Clinico-morphological patterns ofbreast cancer including family history in a New Delhi hospital, India – a cross-sectional study. *World J Surg Oncol*, **3**, 67.

Sarin R (2009). Landscape of cancer in india overview of indian institutions and possible collaborationsdirector, advanced centre for treatment research and education in cancer (actrec) tata memorial centre Mumbai, India Sarin, caBIG 2009.

Saxena S, Szabo CI, Chopin S, et al (2002). BRCA1 and BRCA2 in Indian breast cancer patients. *Hum Mutat*, **20**, 473-4.

Shavers VL, Harlan LC, Stevens JL (2003). Racial/ethnic variation in clinical presentation, treatment, and survival among breast cancer patients <35. *Cancer*, **97**, 134-47.

Singh MM, Devi R, Walia I, Kumar R (1999). Breast self examination for early detection of breast cancer. *Indian J Med Sci*, **53**, 120-6.

Somdatta P, Baridalyne N (2005). Awareness of breast cancer in women of an urban resettlement colony of Delhi. *Indian J Cancer*, **42**, 149.

Sonal S (2010). Cancer therapy: Stasis no more www.expresshealthcare.in, June 2010.

Tavani A, Gallus S, La Vecchia C, et al (1999). Risk factors forbreast cancer in women under 40 years. *Eur J Cancer*, **35**, 1361-7.

Tewari M, Pradhan S, Kumar M, Shukla HS (2006). Effectof prevailing local treatment options of breast cancer on survival outside controlled clinical trials: experience of a specialist breast unit in North India.*World J Surg*, **30**, 1794-801.

World Health Organization and Health Action International,' Measuring medicine prices, availability, affordability, and price components'. chapter 1 " introduction";2nd edition, 2008.page1.

World Health Organization and Health Action International," Measuring medicine prices,availability, affordability and price components". chapter 8 " Data analysis and interpretation", 2nd edition, 2008, pg 118.