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Decade of Breast Cancer-Trends in Patients Profiles Attending Tertiary Cancer Care Center in South India

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ABSTRACT

Breast cancer cases have been increasing worldwide over the span of last few decades but the greatest increase is seen in developing Asian countries. In 2008 India, had about 115,000 new cases with 53,000 deaths a ratio of 2:1 (meaning 1 death for 2 detected cases). There is a lacuna in documentation of the true incidence of breast cancer in India. This retrospective study was carried out for the better understanding the socio-demographic pattern and risk factors of breast cancer patients presenting to a tertiary care hospital, located in north Karnataka in southern India. The record based descriptive epidemiological data pertaining to demography and risk factors for breast cancer patients for period of 2001-10 was analyzed. Totally 20,505 cases of cancer were reported during 2001-2010 of which 1,829 (8.92%) were breast cancer patients. The average age was 49.16 and the median age was 48. Maximum numbers were in the age group of 41-50. Most of the patients came from rural area and majority were from lower socioeconomic status. Obesity was seen in 34.00% of patients. The most common histology was infiltrating duct carcinoma (92.07%). Family history of cancer was seen in 107 (7.19%) of cases. This epidemiological study helps to understand the unique patterns in incidence of breast cancer in this region and to some extent the associated probable risk factors. The increasing burden of breast cancer in Indian women warrants rigorous epidemiological investigations of trends observed in different rural, semi-urban and urban populations.

Key words: Breast cancer, India, epidemiology, pattern, profile

INTRODUCTION

Breast Cancer (BC) cases have been increasing worldwide over the span of last few decades (Hortobagyi *et al*., 2005; Anderson and Jakesz, 2008; Porter, 2008) but the greatest increase is seen in developing Asian countries (Green and Raina, 2008). The average age of BC in Asian women is in their forties (Green and Raina, 2008) and the same in USA and Europe, it is in their sixties. The global difference in the incidence of breast cancer can be attributed to factors such as racial/ethnic background, geographic variation, lifestyle, socioeconomic status, genetic variation, the presence of unknown risk factors, environmental factors, screening programmes, utilization of mammography, stage of disease at diagnosis and the availability of appropriate care (Hortobagyi *et al*., 2005).

A comparison drawn from the data available from 'Globocon', the latest of which is for the year 2008 of BC in India with western nations like the USA gives a good idea of the trends it is

following. The lifetime probability of developing BC in India is 1 in 22 women compared to 1 in 8 in US and other developed countries (Kulkarni *et al.*, 2012). When the actual numbers of cases are considered, India is not far behind. In USA reported cases of BC for the year 2008, were about 182,000 compared to 115,000 cases reported from India for the same year. This implies that although the percentage of incidence of BC is less the total number of cases is 2/3rd of that of USA and is steadily rising. A ratio between the incidence and mortality gives a good idea of disease management and patient survival. USA has 182,000 new cases of BC and about 40,000 deaths, a ratio of 4.5:1 (meaning about 1 death for 4.5 new cases detected). Where as in India, about 115,000 new cases of BC with 53,000 deaths a ratio of 2:1 (meaning 1 death for 2 detected cases). As the management strategies and disease control programs evolve, the mortality will decrease. A later stage at diagnosis and lower survival have been linked to poor access to health care facilities and lower awareness, especially in the urban poor and rural populations as well as demographic factors such as lower education and literacy (Ali *et al.*, 2008; Somdatta and Baridalyne, 2008). Absence of compulsory reporting and registration of cancers, there is a lacuna in documentation of the true incidence of BC in India. Many of the BCs are treated in small hospitals and are never reported, consequently the true incidence is much higher than recorded (Leong *et al.*, 2010). More emphasis should be given on early detection and increased use of systemic therapy. This can be achieved with a better understanding of the trends, age group involved with other risk factors involved in the manifestation of BC (Chauhan *et al.*, 2011).

Cancer in humans can be best understood at population level by epidemiological studies. Epidemiology is the study of the distribution and patterns of incidence of disease, characteristics of the disease and their causes or influences in well-defined populations. In recent years epidemiological based studies at local population based level are increasingly gaining importance. Such studies enable us to study gene-environment interactions and to assess the effects of our interventions at the population level (Yeole and Kurkure, 2003).

BC presents a great deal of immunological and histological heterogeneity in character (Chandra, 1979). There are many schools of thoughts with regard to the management of BC. Hence the knowledge of the trends and pattern for specific populations is essential. This retrospective study was carried out for the better understanding of the trend, age group involved with other risk factors among BC patients, reporting to a premier tertiary cancer care center, Karnataka Cancer Therapy and Research Institute (KCTRI), located in North Karnataka in Southern India.

MATERIALS AND METHODS

Study design and study population: A retrospective and descriptive study was undertaken, covering a period of 10 years from 2001-2010. It was conducted in a hospital situated in North Karnataka in South India. This hospital is providing tertiary cancer care to patients in northern Karnataka and neighboring areas. After obtaining approval from the institutional ethical committee, the medical records department was approached to obtain case files of all the cancer cases in the period.

Data collection and analysis: Histopathologically diagnosed cases of BC with regular follow-up were included in the study. The data of the patients with irregular follow-up (less than six months) was excluded. A total of 1829 BC patients presented to the hospital, of which 1488 patients fulfilled the inclusion criteria and their data regarding age, family history, socio-demography, clinical

features, etc., were retrieved and collected on a predesigned data collection sheet. The collected data was systematically tabulated. SPSS, version 11.5, statistical analysis programme (SPSS, Inc., Chicago, IL) was used to analyze the data.

RESULTS

Totally 20,505 cases of cancer were reported during 2001-2010, of which 9,333 (45.5%) were males and 11,172 (54.5%) were females. Considering both the sexes the three major cancers were cervical cancer with 4,605 (22.46%) patients, esophageal cancer with 3,485 (17%) patients and oral cavity cancer with 2,509 (12.24%) patients. BC ranked fifth overall with 1,829 (8.92%) patients. Likewise in males esophageal cancer had 2,103 (22.53%) patients, pharyngeal cancer 2,071 (22.19%) patients and oral cavity cancer 1,816 (19.46%) patients. Similarly in females' major cancers were cervical cancer with 4,605 (41.22%) patients, BC with 1,795 (16.07%) patients and esophageal cancer with 1,382 (12.37%) patients (Table 1). Of the total 1,829 registered BC patients, the data of 1,488 which satisfied the inclusion criteria was used for further analysis.

Among 1,488 BC patients 1,470 (98.79%) were females and 18 (1.21%) were males. The average age of the patients was 49.16 (SD = 11.79) and the median age was 48. The youngest and the oldest patients were 16 and 92 respectively. Maximum number of patients i.e., 509 (34.21%) were in the age group of 41-50, followed by 343 (23.05%) patients in the age group of 51-60 (Fig. 1). Nine hundred and twelve (61.29%) of the patients were pre-menopausal and younger than 50 years.

Most of the patients came from rural area (70%), compared to urban (30%) area. About 84.88% patients were Hindus, 13.31% were Muslims and 1.81% were Christians (Table 2). Most of patients were house wives (86.92) and a majority of the patients belonged to lower socioeconomic status. Very few patients indulged in habits like chewing tobacco or beetlenut (3.90%). The 61.30% patients followed vegetarian diet while 38.70% eat non-vegetarian food. Obesity was seen in 34% of patients, 15% were over-weight, 29% were of normal weight and 22% patients were underweight (Fig. 2).

The 48.20% patients had the cancer in the right breast and 51.35% cases had it in the left breast. 0.27% had it in both breasts. Infiltrating Duct Carcinoma (IDC) was the most common histology found in 92.07% of BC patients. Family history of cancer was seen in 107 (7.19%) of cases.

Table 1: Top ten cancers in KCTRI from 2001-2010

Men-9,333			Women-11,172			Total-20,505		
Type of cancer	%	n	Type of cancer	%	n	Type of cancer	%	n
Oesophagus	22.53	2,103	Cervix	41.22	4,605	Cervix	22.46	4,605
Pharynx	22.19	2,071	Breast	16.07	1,795	Oesophagus	17.00	3,485
Oral Cavity	19.46	1,816	Oesophagus	12.37	1,382	Oral Cavity	12.24	2,509
Lymphoma	4.95	462	Oral Cavity	6.20	693	Pharynx	11.95	2,450
Leukaemia	4.41	412	Ovary	4.20	469	Breast	8.92	1,829
Stomach	3.08	287	Pharynx	3.39	379	Leukaemia	3.05	626
Brain and spinal chord	2.68	250	Leukaemia	1.92	214	Lymphoma	2.99	613
Rectum	2.59	242	Rectum	1.63	182	Ovary	2.29	469
Soft tissue sarcoma	2.20	205	Lymphoma	1.35	151	Rectum	2.07	424
Penis	1.66	155	Soft tissue sarcoma	1.26	141	Stomach	1.95	399
All other sites	14.26	13,31	All other sites	10.39	1,161	All other sites	15.10	3,097

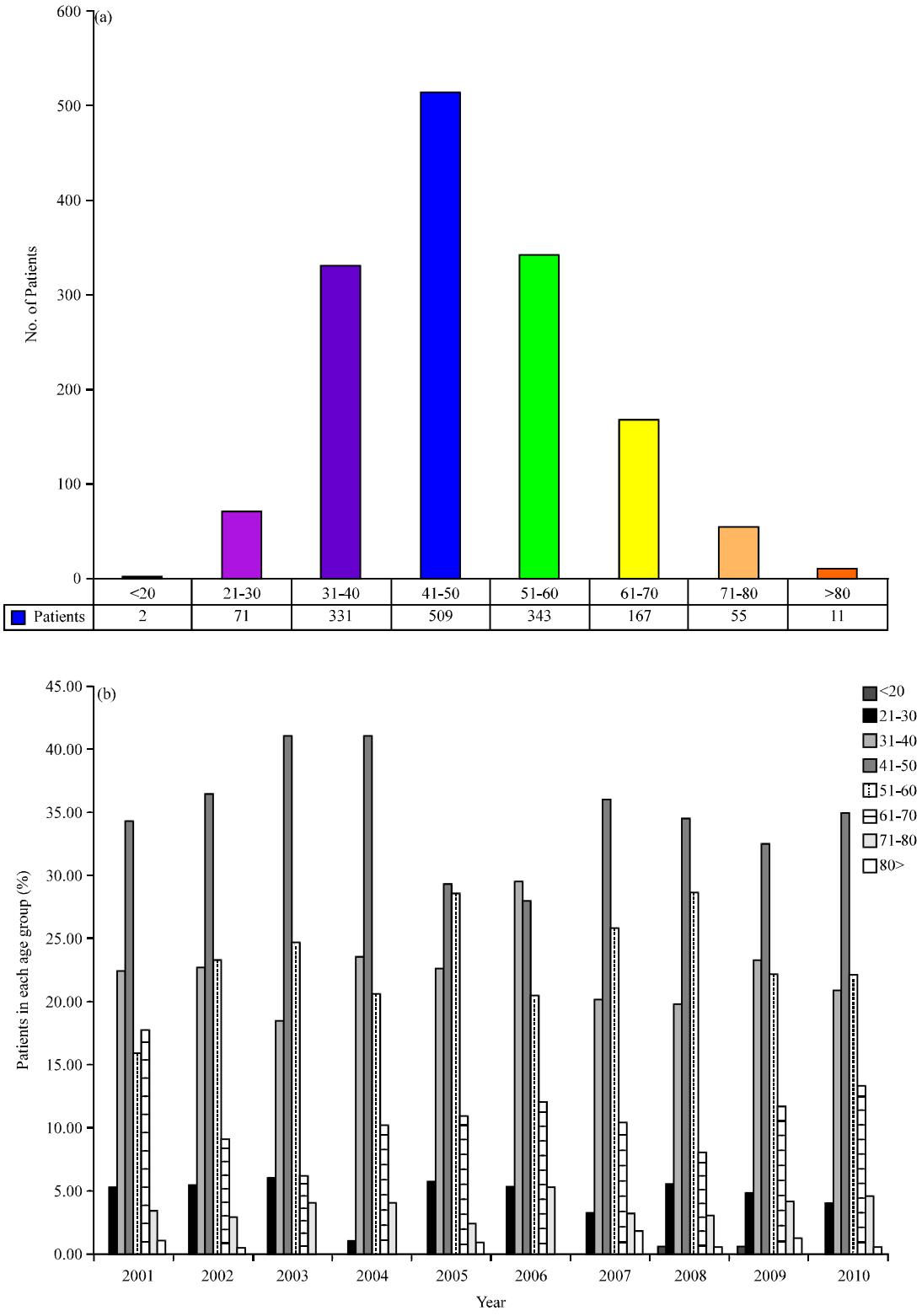


Fig. 1(a-b): (a) Age wise distribution of patients from 2001-2010 and (b) Year wise distribution of patients from 2001-2010

Table 2: Year wise distribution of breast cancer patients based on religion and area

	Religion			Area	
Year	Christian	Muslim	Hindu	Rural	Urban
2001					
n	1.00	16.00	153.00	167.00	3.00
%	0.59	9.41	90.00	98.24	1.76
2002					
n	6.00	36.00	157.00	160.00	39.00
%	3.02	18.09	78.89	80.40	19.60
2003					
n	6.00	6.00	37.00	17.00	32.00
%	12.24	12.24	75.51	34.69	65.31
2004					
n	0.00	13.00	85.00	57.00	41.00
%	0.00	13.27	86.73	58.16	41.84
2005					
n	1.00	16.00	103.00	69.00	51.00
%	0.83	13.33	85.83	57.50	42.50
2006					
n	3.00	110.00	20.00	87.00	46.00
%	2.26	82.71	15.04	65.41	34.59
2007					
n	2.00	21.00	161.00	121.00	63.00
%	1.09	11.41	87.50	65.76	34.24
2008					
n	2.00	25.00	171.00	137.00	61.00
%	1.01	12.63	86.36	69.19	30.81
2009					
n	3.00	18.00	143.00	96.00	68.00
%	1.83	10.98	87.20	58.54	41.46
2010					
n	3.00	27.00	143.00	120.00	53.00
%	1.73	15.61	82.66	69.36	30.64

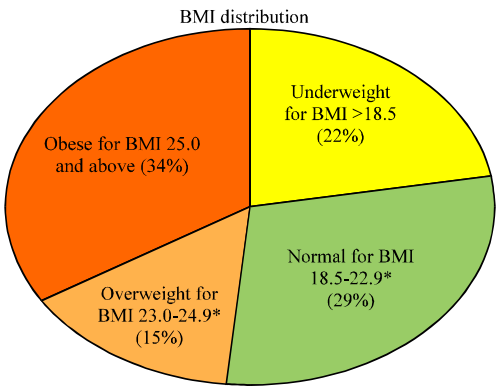
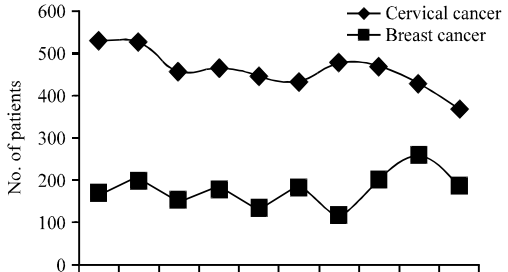


Fig. 2: Patients BMI distribution from 2001-2010

DISCUSSION

The aim of this retrospective analysis was to study the epidemiology of BC at a prominent tertiary cancer care hospital situated in North Karnataka in South India. One-fourth of all cancers



2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
530	527	457	467	446	433	479	470	428	368
171	200	155	180	137	182	119	203	260	188

Fig. 3: Breast cancer patient's v/s cervical cancer patients from 2001-2010

in Indian women and about half of all cancer-related deaths in Indian women are due to BC. During 2000-2009 BC was the most common cancer in women in all urban population-based registries, with the exception of Chennai. Earlier cancer of the uterine cervix was the most common type of cancer, even in urban centers. Data from all urban and rural population-based cancer registries in India suggest a rising incidence of BC in India (Leong *et al*., 2010). Similar rates of increase in BC can be seen in the present study (Fig. 3).

Advancing age is considered to be a significant risk factor in the western literature; however women in Asia including India in particular appear to be at risk at an earlier age as is illustrated from the age distribution of the cases in this study as well (Harrison *et al*., 2010). In India, BC incidence peaks among women 45-50 years of age (Leong *et al*., 2010). The mean age of women with BC in our study is 49.16 (SD = 11.79) years. This is a decade younger than seen in epidemiological reports on BC elsewhere in developed countries (Anderson *et al*., 2007). Other Indian studies have shown similar of that is closer to that in the present study (Gupta *et al*., 2002; Pakseresht *et al*., 2009; Kalyani *et al*., 2010; Harrison *et al*., 2010; Sandhu *et al*., 2010; Chauhan *et al*., 2011; Lodha *et al*., 2011; Singh *et al*., 2011; Datta *et al*., 2012). Median age of 48 years in our patients with BC is also much lower than median age seen in American population at 62 years (Anderson *et al*., 2006). These differences in the age of presentation with BC in Indian women warrants for having different recommendations of screening age (Chauhan *et al*., 2011).

Most of the earlier reports from India have associated increase in BC with greater urbanization and changing life styles. The population in this study was predominantly from a rural background. This reaffirms the fact that this disease is no longer confined to an urban setting (Harrison *et al*., 2010). In this study, it was found that 70% of patients were from rural background. Previous reports from India as well as other parts have showed higher incidence of BC in urban population compared to the rural population (Chopra, 2001; Coughlin *et al*., 2002). It has been observed that rural women face substantial barriers in receiving preventive health care services (Coughlin *et al*., 2002). This explains the higher incidence of BC in rural areas. It should also be taken into consideration that, maximum patients from rural area attend to the tertiary cancer care hospital situated in North Karnataka in South India, thus accounting for higher number of rural breast carcinoma patients. In India 70-80% of India's population resides in rural areas. The current data available regarding cancer including BC is mainly from the urban registries. Hence it becomes extremely difficult to estimate the load of BC in rural areas (NCRP, 2001). Most of the patients were from lower socioeconomic status and a similar finding has been observed in other studies (Sandhu *et al*., 2010).

Indian population structure can be subdivided into strictly defined endogamous castes, tribes and religious groups (Singh, 2002). Religious groups in India have some characteristic life style differences, which may influence the occurrence of cancer (Yeole and Kurkure, 2003). During the 10-year period 2000 to 2010 the break-down by religion was as follows; 84.88% patients were Hindu, 13.31% were Muslim and 1.81% were Christian.

Most of the Hindus in India have vegetarian diet. Reports suggest vegetarian diets decrease risk for prostate cancer (Rajaram and Sabate, 2000). Studies comparing non-vegetarian and vegetarian diets from India have reported that vegetarians have a reduced risk of oral (Rao *et al.*, 1994), esophageal(Rajaram and Sabate, 2000) and BCs (Rajaram and Sabate, 2000). The pulses like beans, chickpeas and lentils, etc., are good source of protein and these are significantly associated with reductions in cancer (Mills *et al.*, 1989; Jain *et al.*, 1999; Sinha *et al.*, 2003). The present study comprised 61.30% patients following vegetarian diet while 38.70% eat non-vegetarian food. This may be because, most of the patients from Hindu community (84.88%).

The associations of BC and anthropometric factors like height, weight and Body Mass Index (BMI) have been reported previously (Lin *et al.*, 1971; Li *et al.*, 1997; Singh *et al.*, 2011). Increased levels of fat tissue in the obese individuals store toxins which can serve as a continuous source of carcinogens (Friedenreich, 2001). Endogenous estrogen production and storage, have been associated with body fat which also, could increase the risk of BC (Graham *et al.*, 1991). Visceral fat or abdominal fat leads to increase in free estrogen (Stoll, 1996). There is also considerable evidence that increase in the bio-available estrogen fraction promotes tumor growth (Key and Pik, 1988; Schapira *et al.*, 1990; Bernstein and Ross, 1993; Ballard-Barbash, 1994; Del Giudice *et al.*, 1998; Persson, 2000; Verkasalo *et al.*, 2001; Singh *et al.*, 2011). Forty nine percent of patients in current study are obese (34%) and overweight (15%).

Most of the patients reported BC on the left side (51.35%). These results are in concurrence with the previous reports (Hussain *et al.*, 1994; Schwartz, 1998; Perkins *et al.*, 2004; Lee, 2005). This could be due to the reason that the left breast is found to be bulkier and the upper outer quadrant has a relatively larger volume of breast tissue compared to right breast (Schwartz, 1998; Lee, 2005; Sandhu *et al.*, 2010).

Histologic types of BC in India are characterized by a high frequency of IDC. Medullary, lobular and squamous cell carcinoma were typical histological varieties of the older age groups, whereas ductal carcinoma was encountered mostly in premenopausal women (Leong *et al.*, 2010). Our study as well as reports from India and the western world indicate that IDC is the most commonly encountered histopathology (Hussain *et al.*, 1994; Schwartz, 1998; Harirchi *et al.*, 2000; Goel *et al.*, 2003; Sandhu *et al.*, 2010).

About 7.19% of patients had family history of BC. This is slightly lower than 10% seen in western developed nations as well as that seen in developing nations like Bahrain and Malaysia where family history was seen in 20 and 16.2%, respectively but in Shanghai the same was 3.2% (Yuan *et al.*, 1988; McPherson *et al.*, 2000; Yip *et al.*, 2008; Al-Saad *et al.*, 2009). A family history of BC in the mother, father, sister or daughter increases the risk of BC and the risk is even stronger if the family member was diagnosed before the age of 50 years old and/or with pre-menopausal BC (Yeole *et al.*, 1990). Specifically, if a woman has a first-degree relative >50 years diagnosed with post-menopausal BC, her risk increases by 80% (Singletary, 2003) whereas a first-degree relative with pre-menopausal BC increases a woman's risk by 330% (Singletary, 2003). The risks increase for a higher number of first- and second-degree relatives diagnosed with BC (Mahoney *et al.*, 2008). A history of ovarian cancer in other relatives (in the mother's or father's families) also

increases the risk of BC (Mahoney *et al.*, 2008). Considering the younger age of BC in present study greater importance should be paid to family history (Chauhan *et al.*, 2011).

In conclusion, this epidemiological study helps to know the incidence of BC in this region and to some extent the associated probable risk factors. Despite much research, BC persists as a major health burden. There is no comprehensive source of epidemiological and clinicopathological, data for BC patients in India (Leong *et al.*, 2010). It is likely that the descriptive epidemiology of BC will continue to provide insights into the aetiology of the disease and will allude to the role of primary prevention, early diagnosis and treatment.

In present study the mean age of BC is a decade younger compared to patients from the western population. This raises some doubts on mammography as a screening tool. The sensitivity of mammography decreases with increase in the density of breast tissue at younger age. The affordability of mammography is also difficult due to poor socioeconomic background.

India does not have an organized large-scale BC screening program. Most of the screening reports from India were carried out on small communities, covering a small proportion of the Indian population. In India population-based BC screening is not recommended due to limited resources and the lack of local statistics on mammography and BCs. The increasing burden of BC in Indian women warrants rigorous epidemiological investigations of trends observed in different rural, semi-urban and urban populations.

Very few BC cases are detected by screening and a majority of all Indian BCs are clinically detected (Leong *et al.*, 2010). Hence considering the younger age of onset of BC and the rural background combined with poor socioeconomic status of majority patients there is a need for the evaluation of screening efficacy in Indian settings for determining the best screening strategy in different Indian sub-populations. Similarly the BC management strategies should be standardize to fit specific populations.

This is only a hospital records based study. However this study leads for further etiological research, identify the high risk groups that have greatest impact in BC development and helps to take-up BC preventive measures and screening programmes in early detection of BC.

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