

RESEARCH ARTICLE

Descriptive Epidemiology of Female Breast Cancer in Delhi, India

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Abstract

Background: Breast cancer is the most frequently diagnosed cancer in females worldwide. The Population Based Cancer Registry data of Delhi were here used to describe the epidemiology and trends in breast cancer incidence in Delhi. **Methods:** Crude rate, age-standardized incidence rates (ASR) and age-specific incidence rates were calculated using the data collected by Delhi PBCR for the year 2012. The time trend of breast cancer incidence was evaluated by joinpoint regression using the PBCR data from 1988-2012. **Results:** A total of 19,746 cancer cases were registered in 2012, 10,148 in males and 9,598 in females. Breast cancer was the leading site of cancer in females accounting for 2,744 (28.6%) of cases with a median age of 50 years. The crude and age standardized incidence rates for breast cancer were 34.8 and 41.0 per 100,000 females, respectively. Age specific incidence rates increased with age and attained a peak in the 70-74 years age group. A statistically significant increase in ASR with an annual percentage change (APC) of 1.44% was observed. **Conclusions:** The breast, which was the second most common cancer site in Delhi in 1988, has now surpassed cancer of cervix to become the leading site over the years. A similar trend has also been noted for other metropolitan cities viz. Bangalore, Bhopal and Chennai. Though the ASRs in these are comparable, they are still low compared to Western countries. Changing life styles in metropolitan cities like delayed marriage, late age at first child birth, lower parity and higher socio-economic status, may be some of the probable primary cause for higher incidences of breast cancer in urban as opposed to rural areas.

Keywords: Breast cancer- population based cancer registry- incidence- trends- epidemiology

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Introduction

Breast cancer is the most frequent cancer among women in the world with an estimated 1.67 million new cancer cases diagnosed in 2012 which constituted about 25% of all cancers (Ferlay, 2013). It ranks second overall among all cancers in the world. It is now the most common cancer both in developed and developing regions with slightly more in less developed region (883,000) than in developed region (794,000). Incidence rates vary from 27 per 100,000 women in Middle Africa and Eastern Asia to 96 per 100,000 women in Western Europe.

It ranks as the fifth cause of death from cancer overall with 522,000 deaths and it is the most frequent cause of death among women. The mortality rates ranges between 6 in Easter Asia to 20 per 100,000 in Western Africa.

The estimated number of breast cancer cases in India during 2012 was 145,000 cases with age standardized incidence rate of 25.8 per 100,000 women. The estimated number of deaths in India in the year 2012 was 70,000.

A descriptive analysis is used to report pattern, incidence and trends of breast cancer among Delhi women.

Materials and Methods

The study is based on data collected by Delhi Population Based Cancer Registry for the year 2012.

Delhi, the capital of India covers an area of 1483 sq.kms. The population of Delhi includes Hindu, Urdu, English and Punjabi speaking masses. The rural and urban compositions of Delhi are 591.9 and 891.1 sq.kms respectively. According to 2011 census, the total population of Delhi was 1,67,53,235 (urban :1,63,33,916, rural: 4,19,319) with 97.5% of people living in urban areas. The registry covers only the urban population of Delhi which is 1,63,33,916 with 87,49,440 males and 75,84,506 females

The population at risk during the year 2012 was estimated using Difference Distribution Method (Takiar and Shobana, 2009) based on the Census figures of 2001 and 2011 (Census of India, 2011).

Crude rate, age-specific incidence rates and age-standardized incidence rates (ASR) per 100,000 females by direct method using the world standard population (Jensen, 2003) have been evaluated.

Time trends have been studied by calculating the annual percentage change in the age-standardized

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incidence rates and age-specific incidence rates using twenty five years of data collected by Delhi PBCR from the year 1988 to 2012. The annual percentage change was estimated with log-linear Poisson regression models, using the US National Cancer Institute's Joinpoint Regression Analysis Program (Version 3.5.4) (Kim, 2009).

Results

During 2012, a total of 19746 new cancer cases were registered with 10148 males and 9598 females. Female breast cancer constituted about 2744 (28.6%) of cases. It was the most common type of cancer among female. Table 1 show the age distribution of female breast cancer in Delhi where the majority of cases (14.3%) are 45-49 years age group. The median age of these cases was 50 years.

The world age adjusted incidence rate for breast cancer was 41.0 per 100,000 females whereas the crude incidence rate was 34.8 per 100,000 females.

The age-specific incidence rate curves are shown in Figure 1. The age-specific incidence rates in general found to increase with age. Rates are low in young age and then began to rise rapidly starting with women 25-29 years and peaked at 70-74 years with a rate of 185.2 per 100,000 females.

Age-standardised incidence rates of breast cancer for Delhi females for the years 1988-2012 are presented in Figure 2. The age-standardised incidence rates for female breast cancer in Delhi increased over the time periods. The rates increased from 24.8 in 1988 to 41.0 in 2012.

The annual percentage change for female breast cancer incidence rates significantly increased annually with an annual percentage change (APC) of 1.44% during 1988-2012. The APC was 0.91% for 1988-2007 and it was 5.31% for the latter period 2008-2012.

The age specific incidence rates for different age-groups over the time period 1988-2012 are shown in figure 3. From 1988-2012, a significant declined was observed for the age group 0-29 years (Table 2). From 1988 through 2006, the rate decreased 2.3% annually for women 30-39 years old and increased 7.1% annually

Table 1. Age Distribution of Female Breast Cancer Incident Cases in Delhi, 2012

Age Group	No.	%
<25	26	0.9
25-29	41	1.5
30-34	117	4.3
35-39	221	8.1
40-44	311	11.3
45-49	393	14.3
50-54	387	14.1
55-59	363	13.2
60-64	334	12.2
65-69	208	7.6
70-74	181	6.6
75+	162	5.9
Total	2,744	100

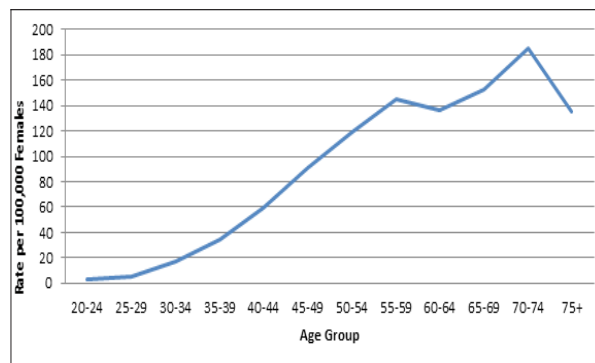


Figure 1. Age Specific Incidence Rates for Breast Cancer, Females, Delhi, 2012

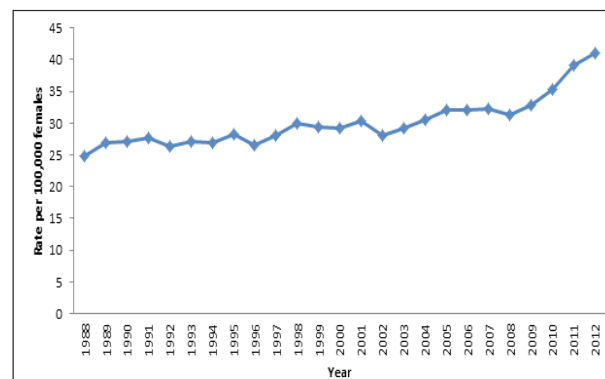


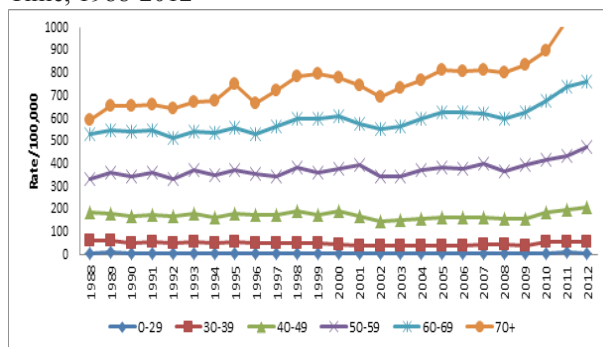
Figure 2. Age Standardised Breast Cancer Incidence Rates by Year, Females, Delhi, 1988-2012

Table 2. Annual Percent Changes (APC) for Breast Cancer Incidence Rates and Joinpoint Analysis by Age

Age	Trend 1		Trend 2	
	Range of years	APC	Range of years	APC
0-29	1988-2012	-0.7		
30-39	1988-2006	-2.3 *	2006-2012	7.1*
40-49	1988-2009	-0.1	2009-2012	8.1
50-59	1988-2012	1.6*		
60-69	1988-2012	1.7*		
70-79	1988-2012	3.7*		

*The APC is significantly different from 0 (P<0.05)

Figure 3. Trends in Age Specific Incidence Rates Over Time, 1988-2012



during 2006-2012. Though an annual increase of 8.1% was observed for 40-49 years through 2009-2012 after a significant decline during 1988-2009, it is not statistically

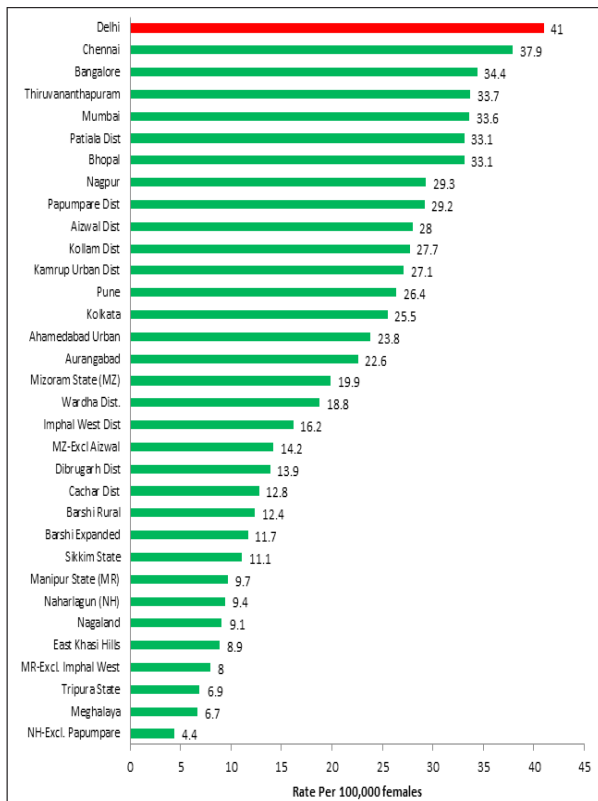


Figure 4. Age Standardized Incidence Rates for Breast Cancer in Different Places of India

significant. Amongst the age groups 50-59, 60-69 and 70-79 years old, the breast cancer incidence rate gradually rose from 1988-2012.

Discussion

The breast cancer is the most common cancer among female in Delhi. Many other metropolitan cities in India also reported breast cancer as most common cancer in women. The age standardized incidence rates of female breast cancer in Delhi is the highest among the Indian registries reported (National Cancer Registry Programme, 2016). The rates are much lower compared to the incidence rates reported from developed Western countries (Ferlay, 2013).

The median age at diagnosis was 50 years in Delhi with peak being in the age group 45-49 years is consistent with many other Asian countries, while the median age of Western countries are in the age range of 50-55 years (Leong et al., 2010, Yip, 2009, Toi et al., 2010). It is possible that the higher median age at diagnosis among women in Western countries could be partly explained by the population-based mammography breast screening program that is widely available in these countries, which typically targets women aged 50 years and over (Youlden et al., 2012) and is not at all available in India. Another factor for the difference in age of onset of female breast cancer between Asian countries and Western countries can be attributed to differences in life expectancy, with a greater proportion of the population in the younger age groups for females in developing countries (United Nations, 2010).

In 1988 when the Delhi PBCR was established, breast was the second leading site of cancer among women in Delhi preceded by carcinoma of cervix and over the year it surpassed and became the first leading site of cancer like in other cities Bangalore, Bhopal and Chennai. A statistically significant increase in breast cancer incidence was also observed in Delhi over the 25 years. Similar trend is also seen in other urban registries of India (National Cancer Registry Programme, 2013).

The increase in incidence of breast cancer is likely due to the espousal of a more “Westernized” lifestyle, including adverse changes in diet, physical activity and fertility (Shin et al., 2010, Youden et al., 2014, Park et al., 2008, Porter, 2008). This effect has been greatest among younger women living in urban areas of lower and middle income countries (Green and Raina, 2008).

Reproductive issues that impact on lifetime exposure to estrogen have a particularly crucial role in the potential for development of female breast cancer (Key et al., 2001, Parsa P, 2009). Early menarche leads to an early opening of the first window and results in a substantial cumulative exposure to estrogens and the simultaneous presence of progesterone, an exposure theorized to increase the risk of breast cancer (Koreenman, 1980). Several case-control studies have established that the main risk factors for breast cancer in Asian women include early age at menarche, late menopause, higher age at marriage, late age at first child birth, lower mean duration of breast feeding and a lower parity (Koreenman, 1980, Gao et al., 2000, Liu YT et al., 2011, Yanhua et al., 2012, Bhadoria et al., 2013). The prevalence of these reproductive risk factors is on the rise in Asia (Lertkhachonsuk AA et al., 2013) due to fast economic growth.

In future the burden of breast cancer may increase tremendously and therefore top priority should be given for early detection and treatment of the disease.

References

- Bhadoria AS, Kapil U, Sareen N, et al (2013). Reproductive factors and breast cancer: A casecontrol study in tertiary care hospital of North India. *Indian J Cancer*, **50**, 316-21.
- Census of India (2001). Registrar General of India, Socio cultural tables, C14, Population by Five Year Age group by Residence and Sex, New Delhi (www. Censusindia.net).
- Census of India (2011). Registrar General of India, Socio Cultural Tables, C14, Population by five year age group by residence and sex, New Delhi (www. Censusindia.net).
- Ferlay J, Soerjomataram I, Ervik M, et al (2013). GLOBOCAN 2012 v1.0, Cancer Incidence and Mortality Worldwide: IARC Cancer Base No. 11 [Internet]. Lyon, France: International Agency for Research on Cancer.
- Gao YT, Shu XO, Dai Q, et al (2000). Association of menstrual and reproductive factors with breast cancer risk: results from Shanghai breast cancer study. *Int J Cancer*, **87**, 295-300
- 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.
- Jensen OM, Parkins DM, MacLennan R, et al (2003). Cancer registration principles and methods, IARC Technical report No.95, Lyon: IARC Press. pp,131
- Key TJ, Verkasalo PK, Banks E (2001). Epidemiology of breast

- cancer. *Lancet Oncol*, **2**, 133-40.
- Kim HJ, Fay MP, Feuer EJ, Midthune DN (2000). Permutation tests for joinpoint regression with applications to cancer rates. *Stat Med*, **19**, 335-51.
- Korenman SG (1980). Oestrogen window hypothesis of the aetiology of breast cancer. *Lancet*, **1**, 700-1
- Leong SP, Shen ZZ, Liu TJ, et al (2010). Is breast cancer the same disease in Asian and Western countries?. *World J Surg*, **34**, 2308-24.
- Lertkhachonsuk AA, Yip CH, Khuhaprema T, et al (2013). Cancer prevention in Asia: resource-stratified guidelines from the Asian oncology summit 2013. *Lancet Oncol*, **14**, 497-507.
- Liu YT, Gao CM, Ding JH, et al (2011). Physiological, reproductive factors and breast cancer risk in Jiangsu province of China. *Asian Pac J Cancer Prev*, **12**, 787-90.
- Park S, Bae J, Nam BH, Yoo KY (2008). Aetiology of cancer in Asia. *Asian Pac J Cancer Prev*, **9**, 371-80.
- Parsa P, Parsa B (2009). Effects of reproductive factors on risk of breast cancer: a literature review. *Asian Pac J Cancer Prev*, **10**, 545-50.
- Porter P (2008). "Westernizing" women's risks? Breast cancer in lower income countries. *N Engl J Med*, **358**, 213-6.
- Shin HR, Joubert C, Boniol M, et al (2010). Recent trends and patterns in breast cancer incidence among Eastern and South eastern Asian women. *Cancer Causes Control*, **21**, 1777-85.
- Takiar R, Shobana B (2009). Cancer incidence rates and the problem of denominators – a new approach in Indian cancer registries. *Asian Pacific J Cancer Prev*, **9**, 123-6.
- National Cancer Registry Programme (2016). Three year report of population based cancer registries: 2012–2014-report of 27 PBCRs in India. Bangalore, India. pp, 57
- National Cancer Registry Programme (2013). Time trends in cancer incidence rates 1982-2010. Bangalore, India, **83-6**
- Toi M, Ohashi Y, Seow A, et al (2010). The breast cancer working group presentation was divided into three sections: the epidemiology, pathology and treatment of breast cancer. *Jpn J Clin Oncol*, **40**, 13-8.
- United Nations, Department of Economic and Social Affairs, Population Division. World Population Prospects: The 2010 Revision, 2011, **1**, p, 5
- Yanhua C, Geater A, You J, et al (2012). Reproductive variables and risk of breast malignant and benign tumours in Yunnan province, China. *Asian Pac J Cancer Prev*, **13**, 2179-84.
- Yip CH (2009). Breast cancer in Asia. *Methods Mol Biol*, **471**, 51-64.
- Youlten DR, Cramb SM, Dunn NA et al (2012). The descriptive epidemiology of female breast cancer: an international comparison of screening, incidence, survival and mortality. *Cancer Epidemiol*, **36**, 237-48.
- Youlten DR, Cramb SM, Yip CH, et al (2014). Incidence and mortality of female breast cancer in the Asia-Pacific region. *Cancer Biol Med*, **11**, 101-15.