



## Status of Breast and Cervix Cancer in Selected Registries of India

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### Abstract

Breast cancer is the most frequently diagnosed cancer among women in the world. After breast cancer, cervical cancer is the fourth most common cancer affecting women worldwide.

**Objectives:** The present paper explores the incidence rate, age specific rates, methods of diagnosis, types of treatment and time trend in Breast and Cervix cancers reported from selected cancer registries of India.

**Materials and Methods:** The breast and cervix incidence data collected by five urban Population Based Cancer Registries (Bangalore, Bhopal, Chennai, Delhi and Mumbai), working under the network of NCRP over the period of 2012-14 was considered for the study purposes.

**Results:** Breast cancer emerges as the leading site of cancer among women in India and constitutes about 30% of the total cases. Its AAR varied between 33.6 to 41.0. After breast, cervix cancer ranked second in all the five registries. The reported AAR of cervix varied between 9.0 to 15.9 in registries. The cervix cancer cases formed about 12% of the total cases. Breast and cervix cancer cases were found to be rising sharply with age. In case of breast cancer, all registries showed an increasing trend. In case of cervix, a decreasing trend was seen in 3 out of five registries. In case of breast cancer, most often, a combination of surgery, radiotherapy and chemotherapy was preferred ( $\geq 80\%$ ) Overall, the Radiotherapy was the most preferred (91%) type of treatment among the cervix cancer cases.

**Conclusion:** At present, breast cancer and cervix cancer is the leading site of cancers among women in India and can be claimed to posing an important public health problem now and need important inputs from various health and other agencies to tackle it.

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**Keywords:** Breast cancer; Cervix cancer; Trend; Treatment; Diagnosis

### Introduction

Breast cancer is the most frequently diagnosed cancer among women in the world. In 2012, 1.7 million women were diagnosed with breast cancer. Breast cancer is also the most common cause of cancer death among women. Since the 2008 estimates, breast cancer incidence has increased by more than 20%, while mortality has increased by 14% [1]. With 528,000 new cases every year, cervical cancer is the fourth most common cancer affecting women worldwide, after breast, colorectal, and lung cancers. It is also the fourth most common cause of cancer death (266,000 deaths in 2012) in women worldwide. About one fifth of the new cases of cervix are found in India [1]. The present paper explores the incidence rate, age specific rates, methods of diagnosis, types of treatment and time trend in Breast and Cervix cancers reported from selected cancer registries of India.

### Materials and Methods

The cancer incidence data collected by five urban Population Based Cancer Registries (PBCRs), working under the network of NCRP over the period of 2012-14 was considered for the study purposes [2]. The Registries included were: Bangalore, Bhopal, Chennai, Delhi and Mumbai. All the cases of breast and cervix cancer cases reported from the above registries formed the source of data for the present study. The following information related to Breast and Cervix cancer were noted and utilized for further analysis: No. of cases, Age Adjusted Rate (AAR), Percentage of cases in relation to total cancer cases; Age specific Rates; Method of diagnosis; Types of treatment provided; Time trends. The information related to the type of treatments provided to breast and cervix cancers are taken from Hospital Based Cancer Registry Report of 2012-14 [3]. To assess the time trends in selected

**Table 1:** Number of cases, AAR, % of total cases and Ranks as seen in five selected Urban cancer registries of India (2012-14).

Site of Cancer	Registry	No. of Cases	AAR per 100,000	% of Total Cases	Rank
Breast	Bangalore	1249	34.4	27.5	1
	Bhopal	545	33.1	31.2	1
	Chennai	1907	37.9	30.7	1
	Delhi	2744	41	28.6	1
	Mumbai	1943	33.6	28.8	1
Cervix	Bangalore	559	15.3	12.3	2
	Bhopal	219	13.8	12.5	2
	Chennai	783	15.9	12.6	2
	Delhi	1039	15.5	10.8	2
	Mumbai	518	9	7.7	2

Source: NCRP Report (2012-14)

**Table 2:** Age Specific Rates (Per 100,000) by Registries-Breast cancer.

Registry	<25	25-34	35-44	45-54	55-64	≥ 65
Bangalore	0.4	12	67.9	160.1	261.7	451.4
Bhopal	1	23	96.1	184.6	208.2	302.3
Chennai	0.5	16.9	89.5	199.4	278.7	407.6
Delhi	3.1	22.1	84.7	210.5	281	472.3
Mumbai	1.4	11.9	79.8	152.5	235.5	464.2
Mean	1.3	17.2	83.6	181.4	253	419.6
SD	1.1	5.3	10.6	24.8	31	70.1

Source: NCRP Report (2012-14); <sup>-</sup>derived

**Table 3:** Age Specific Rates (Per 100,000) by Registries-Cervix cancer.

Registry	<25	25-34	35-44	45-54	55-64	≥ 65
Bangalore	0.5	1.1	27.1	88.2	108.3	177.6
Bhopal	0.5	2	29.5	84.2	72.9	188.1
Chennai	-	4.1	32.2	80.6	117.5	192.4
Delhi	0.5	7	37.1	76.7	114.7	147.7
Mumbai	0.3	2.5	19.9	39.6	60.8	128.2
Mean	0.5	3.3	29.2	73.9	94.8	166.8
SD	0.1	2.3	6.4	19.6	26.1	27.8

Source: NCRP Report (2012-14); <sup>-</sup>derived

cancers, the incidence rates for the years 2001-2012 provided in NCRP report of 2012-14 [1] was utilized. The presence of significant positive or negative correlation between years and incidence data (AAR) was taken to represent the increasing or decreasing trend. The slope values were taken to represent the yearly change in the Age Adjusted Rates with time. To form an idea about the percentage spread of cases with age, it was thought logical to obtain the percentile distribution of cases with age. From the five yearly frequency distribution of cases for breast and cervix cancer, the percentile age distribution was found out and the values corresponding to 5<sup>th</sup>, 10<sup>th</sup>, 25<sup>th</sup>, 50<sup>th</sup>, 75<sup>th</sup> and 90<sup>th</sup> percentiles were assessed using the appropriate formula.

## Results

The information related to breast and cervix cases as seen in five selected urban cancer registries of India is presented in Table 1.

Breast cancer is the leading site of cancer among women in India. The reported incidence cases of breast cancer for the period 2012-14, varied from 545 in Bhopal to 2,744 in Delhi. The AAR varied between 33.6 in Mumbai to 41.0 in Delhi. The breast cancer cases formed about 30% of the total cases. Cervix cancer is the leading site of cancer

**Table 4:** Percentile distribution<sup>-</sup> of Age for Breast and Cervix Cancer.

Percentile	5	10	25	50	75	90	95
Breast	35	43	46	55	64	74	84
Cervix	41	44	51	60	69	78	82

<sup>-</sup>Calculated

**Table 5:** Method of Diagnosis for Breast cancer by Registries.

Registry	Microscopic	X-ray/ Imaging	Clinical	Others
Bangalore	86.6	0.4	5.8	7.2
Bhopal	99.3	0	0.7	0
Chennai	89.4	2.9	5.9	1.8
Delhi	91.8	5.8	2.2	0.2
Mumbai	91.5	0.4	2.5	5.6
<b>Mean</b>	<b>91.7</b>	<b>1.9</b>	<b>3.4</b>	<b>3</b>
<b>SD</b>	<b>4.7</b>	<b>2.5</b>	<b>2.3</b>	<b>3.3</b>

Source: NCRP Report (2012-14)

among women in India. The reported incidence cases of cervix cancer for the period 2012-14, varied from 219 in Bhopal to 1,039 in Delhi. The AAR varied between 9.0 in Mumbai to 15.9 in Chennai. The cervix cancer cases formed about 12% of the total cases.

## Age specific incidence rates

The age specific rates of breast cancer are provided in Table 2.

Breast cancer is not common before the age of 25 years. However, the incidence rate increases sharply with every ten years rise. The higher incidence of breast cancer (above 100) can be seen mostly after the age of 45 years. The maximum incidence rate of 400 and more can be seen in age group of 65 years or more. This shows the risk of breast cancer rises sharply with every ten years rise in the age. The above observations are equally applicable in the case of all the five selected cancer registries of India. The age specific rates of cervix cancer are provided in Table 3.

Like breast cancer, cervix cancer is also not common before the age of 25 years. However, the incidence rate increase sharply with every ten years rise. The higher incidence of cervix cancer (above 100) can be seen mostly after the age of 55 years. The maximum incidence rate (128.2 to 192.4) can be seen in age group of 65 years or more. This shows the risk of cervix cancer also rises sharply with every ten years rise in the age but not to the extent of rise seen in breast cancer. The above observations are equally applicable in the case of all the five selected cancer registries of India.

### Percentile distribution of age for breast and cervix cancer

The percentile distribution of age for breast and cervix cancer is provided in the Table 4. The percentile distribution actually represent the age at which the given percentage of cases occurs. The 5<sup>th</sup> percentile refers the age by which 5% of the cases have occurred of the selected cancer site. Similarly, the 50<sup>th</sup> percentile value refers to the age by which 50% of the total cases have been occurred.

Based on above data, we can see that 5% of the breast cancer cases occur by the age of 35 years and 50% of the cases occurred by the age of 55 years. Also, we can say from above data that around 10% of the cases can also occur beyond 74 years also. In case of cervix, 5% of the cases occurred by the age of 41 years which is later by 6 years as compared that seen in the case of breast cancer. By the age of 60 years, 50% of the total cervix cases are expected to occur.

### Methods of diagnosis

The method of diagnosis of breast cancer by registries is provided in Table 5. It can be seen from the table that a majority of the cases (86.6% to 99.3%) were diagnosed microscopically suggesting the higher validity of the diagnosis. There are few cases (around 3%) which are diagnosed clinically, also. The method of diagnosis of cervix cancer by registries is provided in Table 6. It can be seen from the table that a majority of the cases (87.2% to 93.4%) were diagnosed microscopically suggesting the higher validity of the diagnosis while about 3% of the cases are diagnosed clinically.

### Time trend in age adjusted rate of breast cancer

The Age adjusted rate of breast cancer for the year 2001 to 2012 by different registries is provided in Table 7. It is expected that all selected registries may not follow similar trend, hence the trend is discussed by registries.

**Bangalore:** In year 2001, the AAR for breast cancer was 27.4 which rose to 34.4 in year 2012. The significant  $r$  ( $p < 0.01$ ) suggests that the trend was positive and the  $b$  was around 0.68. Thus, every year, the breast cancer was rising by 0.68 units.

**Bhopal:** In year 2001, the AAR for breast cancer was 21.8 which rose to 31.6 in year 2012. The significant  $r$  ( $p < 0.01$ ) suggests that the trend was positive and the  $b$  was around 0.77. Thus, every year, the breast cancer incidence was rising by 0.77 units.

**Chennai:** In year 2001, the AAR for breast cancer was 28.1 which rose to 36.3 in year 2012. The significant  $r$  ( $p < 0.01$ ) suggests that the trend was positive and the rate of change was around 0.58. This, every year, the breast cancer incidence was rising by 0.58 units.

**Delhi:** From year 2001 to 2012, the AAR of breast cancer raised from 30.3 to 39.1 and the trend are found to be positive and the rate of change was around 0.95. This suggests that every year, the breast cancer incidence was rising by 0.95 units.

**Mumbai:** From year 2001 to 2012, the AAR of breast cancer raised from 27.2 to 33.6. The trend was found to be positive. It was observed that every year, the breast cancer incidence was rising by 0.65 units.

### Time trend in age adjusted rate of cervix cancer

The Age Adjusted Rate of cervix cancer for the year 2001 to 2012 by different registries of India is provided in Table 8. No time trend was seen in the registries of Bangalore and Delhi while in the registries of Bhopal, Chennai and Mumbai a significant decreasing trend ( $p < 0.01$ ) was observed. Based on slope value, it can be concluded that

**Table 6:** Method of Diagnosis for Cervix cancer by Registries.

Registry	Microscopic	X-ray/ Imaging	Clinical	Others
Bangalore	93.4	0.5	2.5	3.6
Bhopal	92.7	0	1.8	5.5
Chennai	87.2	1.9	7.3	3.6
Delhi	90.4	0.1	9	0.5
Mumbai	87.5	0.6	6.2	5.7
<b>Mean</b>	<b>90.2</b>	<b>0.6</b>	<b>5.4</b>	<b>3.8</b>
<b>SD</b>	<b>2.9</b>	<b>0.8</b>	<b>3.1</b>	<b>2.1</b>

Source: NCRP Report (2012-14)

**Table 7:** Time trend in AAR of Breast Cancer by Registries of India.

Year	Bangalore	Bhopal	Chennai	Delhi	Mumbai
2001	27.4	21.8	28.1	30.3	27.2
2002	26.8	22.7	29.5	27.9	27.9
2003	27.1	21.4	30.4	28.9	27.9
2004	28.9	24.9	32.4	30.2	30.1
2005	32.7	26.7	33.3	31.6	30.2
2006	32.2	24.8	31.8	31.6	34
2007	36.4	21.8	31.3	31.7	32.8
2008	33.7	26.4	30.5	31	33.8
2009	33.7	26	32.3	32.2	30.8
2010	31.6	27.8	34.3	35.3	33.7
2011	33	30.1	35.8	39.1	34.7
2012	34.4	31.6	36.3	41	33.6
Correlation (r)	0.77 <sup>**</sup>	0.85 <sup>**</sup>	0.84 <sup>**</sup>	0.86 <sup>**</sup>	0.86 <sup>**</sup>
Slope (b)	0.68	0.77	0.58	0.95	0.65

Source: NCRP report 2012-14; (r and b-derived); <sup>\*\*</sup>- $p < 0.01$

**Table 8:** Time trend in AAR of Cervix Cancer and by Registries of India.

Year	Bangalore	Bhopal	Chennai	Delhi	Mumbai
2001	16.9	18.6	29.1	19.7	14.1
2002	18.4	19.7	24.1	15.7	13.3
2003	17.7	17.1	21.1	17	11.9
2004	18.5	20.3	22.5	15.6	14.3
2005	17.7	16.3	21.7	18.6	12.8
2006	19.9	17.8	20.4	17.7	14.5
2007	19.5	17.5	17.7	17.3	14.5
2008	17.3	18.4	16.9	16.2	13.9
2009	17	16.6	16.7	13.7	10.5
2010	17.3	15.8	19.2	17.6	10.4
2011	16.1	14.3	17.7	15.4	9.5
2012	15.3	13.8	15.7	15.5	9
r	-0.48	-0.79 <sup>**</sup>	-0.87 <sup>**</sup>	-0.48	-0.72 <sup>**</sup>
b	-0.18	-0.43	-0.92	-0.22	-0.41

Source: NCRP Report 2012-14; (r and b derived); <sup>\*\*</sup>- $p < 0.01$

the decreasing rate in Bhopal, Chennai and Mumbai was -0.43, -0.92 and -0.41 unit per year, respectively.

### Types of treatments

To form an idea about the type of treatments provided in case of breast and cervix cancer, the Hospital Based Cancer Registry (HBCR) data of NCRP, provided in the report of 2012-14 [3] was utilized and

**Table 9:** Type of Treatments for Breast and Cervix Cancer.

Type of Treatment	Breast	Cervix
Surgery (S)	6.9	3.8
Radiotherapy (R)	1.8	33.1
Chemotherapy (C)	6.8	2.8
S+R	3.4	3.1
S+C	13.4	2.2
R+C	3	51
S+R+C	20.2	3.6
Others	44.3	0.2
Unknown	0.1	0.2
<b>Total cases</b>	<b>2848</b>	<b>1699</b>
Any S	43.9	12.7
Any R	28.4	90.8
Any C	43.4	59.6

Source: NCRP-HBCR report (2012-14)

shown in Table 9. From the table, it can be concluded that in case of breast cancer, most often, a combination of treatment is preferred (≥ 80%) rather than a single treatment of Surgery or Radiotherapy or Chemotherapy. In 43% cases, surgery and chemotherapy was performed. In case of cervix, in more than 60% cases, the combination of Radiotherapy and chemotherapy was preferred. Overall, the Radiotherapy was the most preferred (91%) type of treatment among the cervix cancer cases.

## Discussion

Breast cancer is the most frequently diagnosed cancer among women in the world. Data suggests that breast cancer is the leading site of cancer while cervix is the second most common cancer among women in India. The AAR of breast cancer ranged between 33 to 41 per 100,000 while that of cervix ranged between 9.0 to 16.0 per 100,000. Thus, breast and cervix cancer together constitutes about 40% to 50% of the total cancer cases in India. Based on age-specific incidence rate of breast cancer, it can be said that mostly the cases starts after the age of 25 years though very few cases (less than 2 per 100,000) can occur even before the age of 25 years. After 25 years, with the advancement of every ten years, the age-specific rates starts increasing sharply and ultimately reached to the level of more than 400 per 100,000 in women above 65 years. In case of cervix cancer, mostly the cases start occurring after the age of 25 years. The average age specific rate between 25 to 34 years was as low as 3.3 per 100,000, thereafter the age specific rates starts increasing rapidly, as seen in the case of breast cancer. In general, it can be said that cancer increases rapidly with age. The maximum age specific rate is seen above the age of 65 years and generally remains below 200 per 100,000. Percentile distribution of age for breast and cervix cancer is another way of examining the spread of cancer with age. In case of breast cancer, 5% of the cases occur by the age of 35 years and 10% of the cases occur by the age of 43 years. By the age of 55 years, 50% of the total cases are expected to occur. So median age of breast cancer cases is 55 years. Similarly, in case of cervix, 5% cases occur by the age of 41 years and 10% by the age of 44 years. The median age of cervix cancer cases is about 60 years. So, it can be seen that in general, the chances of occurring breast cancer is relatively earlier as compared to occurring of cervix cancer among the women.

All the registries registered a linear trend of increasing in breast

cancer incidences. The increase in incidence was found to be ranging between 0.55 to 0.95 units per year. However, in case of cervix, the linear trend was found to be negative only in the registries of Bhopal, Chennai and Mumbai. The registries of Bangalore and Delhi did not show any significant trend thereby it can be concluded that the incidence of cervix remained more or less same over the period of 12 years in these two registries.

In case of breast cancer, multiple therapies were in use. The most preferred type of treatment was surgery or chemotherapy in combination with radiotherapy. Irrespective of combination chosen, surgery and chemotherapy was used in more than 40% cases while radiotherapy was used in around 30%. It is not very clear what causes breast cancer among women. However, advancing age and a family history of breast cancer are considered as the most significant risk factors. Researchers also think that the greater a woman's exposure to the hormone estrogens, the more susceptible she is to breast cancer [4,5]. It is estimated that in India by the year 2020, the incidence of breast cancer cases will be around 123,634 [6] and the prevalent cases will be around 605,807 [7]. In India, the 5 year survival rates among breast cancer were reported to be around 41.6% [7].

In case of cervix cancer, the most preferred type of treatment was radiotherapy. Radiotherapy alone was used in 33% of the cases while in combination of chemotherapy; it was used in 51% cases. Thus, after radiotherapy, chemotherapy was in frequent use (60% in combination). Some of the common factors which are believed to be the cause of cervix cancer are: HPV infection, multiple sex partners, early sexual contact and smoking [8]. It is estimated that in India by the year 2020, the incidence of cervix cancer cases will be around 123,291 [6] and the prevalent cases will be around 657,141 [7]. In India, the 5 year survival rates among cervix cancer were reported to be around 43.7% [7]. It is encouraging to see that cervix cancer is decreasing in India. However, this is not true with breast cancer. The significant linear trend in breast cancer is a thing of concern for health authorities and health planners of India. A multidisciplinary approach to cancer treatment is essential and this has to be made available at all Regional Cancer Centres. Further, there is a need to plan the most appropriate treatment for the patients diagnosed with breast and cervix cancer. Efforts should be made to reduce the waiting time for cancer patients to get any cancer directed treatments. More than 80% of cancers in India present in advanced stages and palliative care and pain relief are essential to provide good quality life for these patients. At present, breast and cervix cancer are the leading sites of cancer among women in India and can be claimed to be posing as important public health problem now and need important inputs from various health and other agencies to tackle it.

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