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Epidemiology of Breast Cancer in Indian Women: Population and Hospital Based study

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Abstract

Background: Breast Cancer is a leading cause of mortality and ranked apex among females all over the world. Early detection and diagnosis of breast cancer may reduce the increasing burden of the disease. With this background, a Population and Hospital based cancer registries have been studied to understand the epidemiology of breast cancer trends in India.
Objective: The objective of this study is to gather information provided in different cancer registries and analyze the epidemiology of breast cancer statistics in India.
Methods: Age Adjusted Rate, Age Specific Rate and Mortality Incidence Ratio has been considered as evaluation metric.
Results: In this study it has been observed that the Age Adjusted Rate and Mortality rate of Breast Cancer has been reported as 25.8 and 12.7 per 100,000 women respectively.
Conclusion: Additional awareness & screening programs early diagnosis and treatment facilities can only significantly improve the breast cancer's clinical picture in India.

Keywords: Breast Cancer, epidemiology, PBCR, HBCR, ICMR.

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1. Introduction

Instances of Breast cancer have increasingly been reported from various parts of the world since last five decades [1] [2]. A hybrid healthcare model [3] and clustering techniques [4] have been proposed for disease identification for the big data system. The mortality rate and the number of new cases is increasing exponentially owing to lack of awareness, inefficient and last stage identification of breast cancer. It is now reported to be the prime reason for women mortality across the globe. Approximately 1.7 million cases were identified in 2012 out of which 521,900 were detected with cancer. Out of total cancer cases reported 25% cases were of breast cancer and a huge 15% reported loss of life, owing to it [5]. Breast cancer cases are reported primarily from developed countries having mortality rates as high as 38%. The leading contributors are Belgium, Denmark, UK (United Kingdom), USA (United States of America), Germany, Australia and New Zealand. Africa and Asia have reported lesser instances though. As per latest reports, approximately, 10,000 new breast cancer cases are being diagnosed, annually, in India. [6]. E & Y in association with FICCI in 2015 released a report that out of 40% total cancer cases 19% women were detected with breast cancer. In the last decade, a steep rise has been observed in Asian countries [6]. Out of 883000 cases reported, a huge percentage (89.92 %) is of urban women belonging to the developed region as compared to women belonging to the

underdeveloped region [7]. In India AAR of breast cancer is found to be 25.8 whereas in United Kingdom it is 95 per 1 lac women, but the mortality rate of India is (12.7 per lac) whereas it is (17.1 per lac) in United Kingdom [8]. The mortality rate owing to breast cancer has increased rapidly as compared to cervical cancer and is a leading cause of women mortality. Breast cancer is curable subject to early-stage detection. As per the report by ICMR (Indian Council of Medical Research) published by India Today, it was reported that the total number of new cancer cases is approximately 14.5 lakh in 2016 and is expected to reach this count to 17.3 lakh by 2020.

With the advent of technology, E-Health Care Systems are proving to be more effective by providing fast and accurate results. E-Health Care systems are found beneficial in a plethora of domain. This paper focuses on breast cancer statistics discussed in PBCR and HBCR. Cancer is driven by the development of tumor growth, treatment responses, computer-based surgery, radiation therapy treatment, and tumor growth models. A growing convolutional neural network (GCNN) and an improved object detection approach have been proposed for cancer segmentation and analysis in [9-10]. A new Modified Hopfield Neural Network (MHNN) approach has been proposed in [11] human retinal image classification. human psychological disorders, chronic disorders etc have been identified using various data mining techniques [12-14]. This paper has been organized as section 2 discusses the objective of the study, Methods are explained in section 3 and Results of the study is discussed in Section 4.

2. Objective

Breast cancer new instances has been increasing exponentially due to lack of awareness, inefficient treatment and last stage exposure of disease. Additional awareness & screening programs early diagnosis and treatment facilities can only significantly improve the breast cancer's clinical picture in India. Data reports from different cancer registries Delhi, Mumbai, Chennai, Thiruvananthpuram, Dibrugarh, Guwahati, Chandigarh, Ahmedabad, Kollam etc. have been studied. The objective of this review article is to gather information provided in different cancer registries and to study the epidemiology of breast cancer statistics in India as well as in Delhi.

3. Methods

The main source to analyze breast cancer trends is PBCR (Population-Based Cancer Registry). Population-based data is collected from various National Cancer Registry Program (NCRP) Reports and 25 PBCR's across India located in Delhi, Mumbai, Chennai, Thiruvananthpuram, Dibrugarh, Guwahati and Chandigarh [7]. The relative proportion of breast cancer in Indian cities as per the PBCR's in Mumbai (30.3%), Thiruvananthpuram (28.5 %), Chennai (22.4 %), Chandigarh (16.3 %), Bangalore (15.6%), Dibrugarh (14.8%) and Guwahati (14.4%) [15]. The breast cancer relative proportion of various Indian cities is represented in Figure 1:

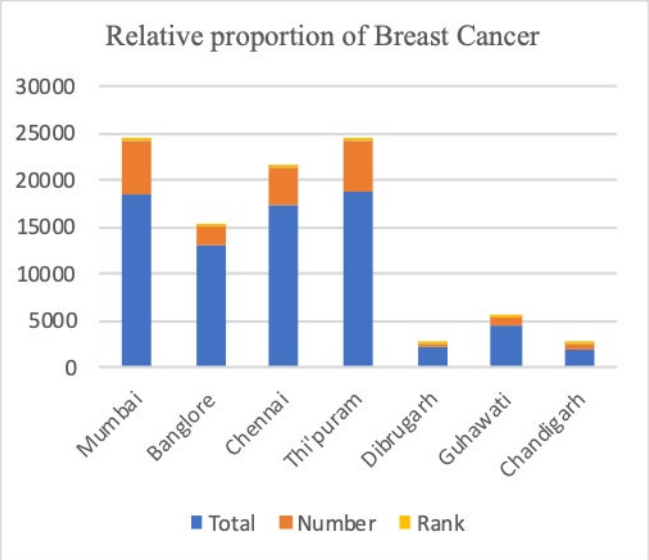

Figure 1. Relative proportion of breast cancer

Figure 2 shows the age distribution trends for different NCRP from (2010-2012) with age intervals. It was observed that Thiruvananthpuram has highest age adjusted rate of 33.9, Delhi having 29.6 and two lowest AAR observed

i.e.8.8 and 8.5 in Barshi rural and Sikkim state respectively. Comparison graph for the same is shown in Figure 3:

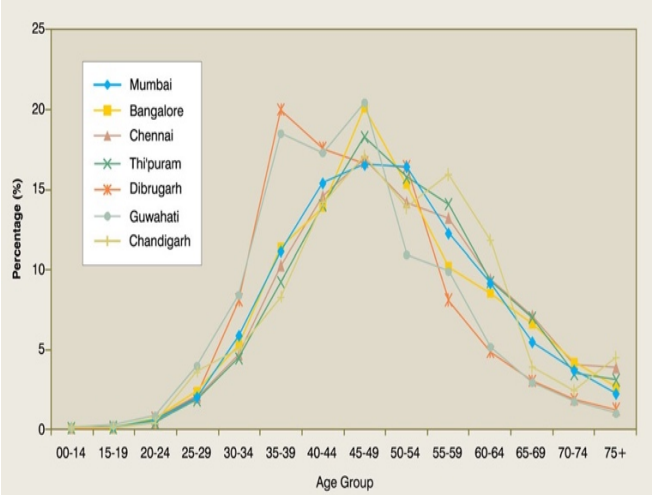

Figure 2. 5-year age distribution trends for different NCRP (2010-2012) –Female Breast (ICD-10: C50)

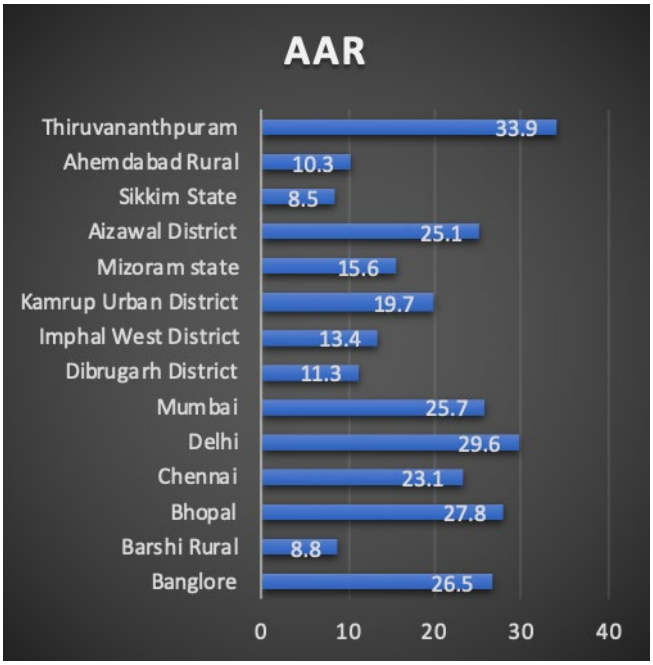

Figure 3. Comparison of AAR (Age Adjusted Rate) of breast cancer (ICD:10:C 50)

Another important scale to assess the cancer mortality rate with relation to incidence is Mortality/Incidence ratio (MIR) [16]. MIR is used to find the mortality rate of a particular region as compared to its incidence rate. Delhi registry found low MIR of 8.0 but it has high incidence cases, whereas in Barshi MIR is as high as 66.3 due to the small incidence of reporting of breast cancer in rural India [17]. This is because of less awareness programs, tedious way of treatment and diagnosis [18-23], incomplete treatment, lack of infrastructure in rural areas of our country as compared to non-rural, semi-urban and urban areas. As breast cancer cases are rapidly increasing in India that also increases the mortality rate [24-25].

4. Results

Delhi PBCR was started in 1988. It was observed that the second most leading rate was of breast cancer for women followed by carcinoma of the cervix. Over the year it became the first leading site of cancer in other cities like Bangalore, Bhopal, and Chennai. As per statistics, there has been a quantum leap in the cases of breast cancer in the last 25 years in Delhi. A similar trend is reported in other urban registries of India, NCRP-2013. In Delhi, the highest age standardized incidence rates of Breast Cancer among the Indian registries have been reported (National Cancer Registry Programme, 2016).

4.1 Population Based Cancer Registry

The PBCR 2012 data were needed to explain the epidemiology of breast cancer incidence trends in Delhi. ASR (Age-standardized incidence Rates) and age-specific incidence rates were computed utilizing the data gathered by Delhi PBCR-2012. Total 19746 new cases of cancer were recorded out of which 10148 were males and 9598 females [26]. Breast cancer constituted 28.6 % (2744 cases) [27]. The age-specific incident rate and age distribution rate is shown in Figure 4 and Table 1 respectively. Age specific incident rate increases as per age. These rates are less in young age and start increasing with 25- 29-year age, goes to a maximum in the age group of 45 – 49 years. Incidences have also been reported in 70-75-year age group.

Table 1. Female Breast Cancer Incident Cases as per Age distribution 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	2744	100

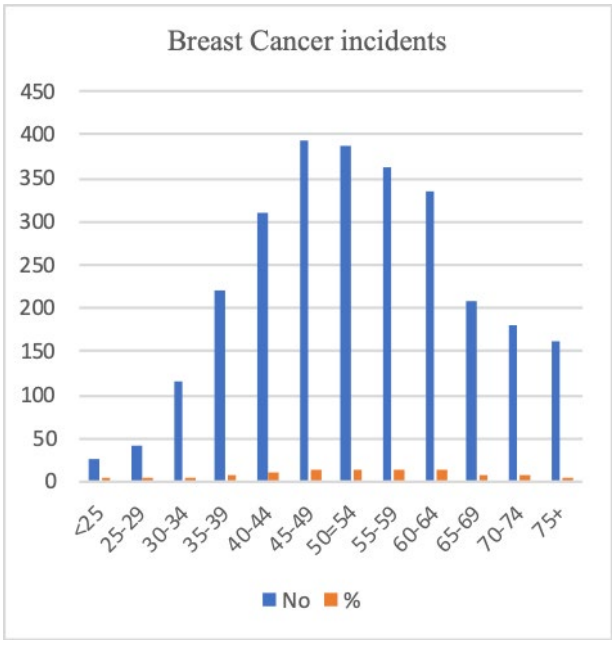

Figure 4. Breast Cancer Incident rates for Female Delhi, 2012

Age standardized incidence rates of various registries in India has been compared, as shown in Figure 5.

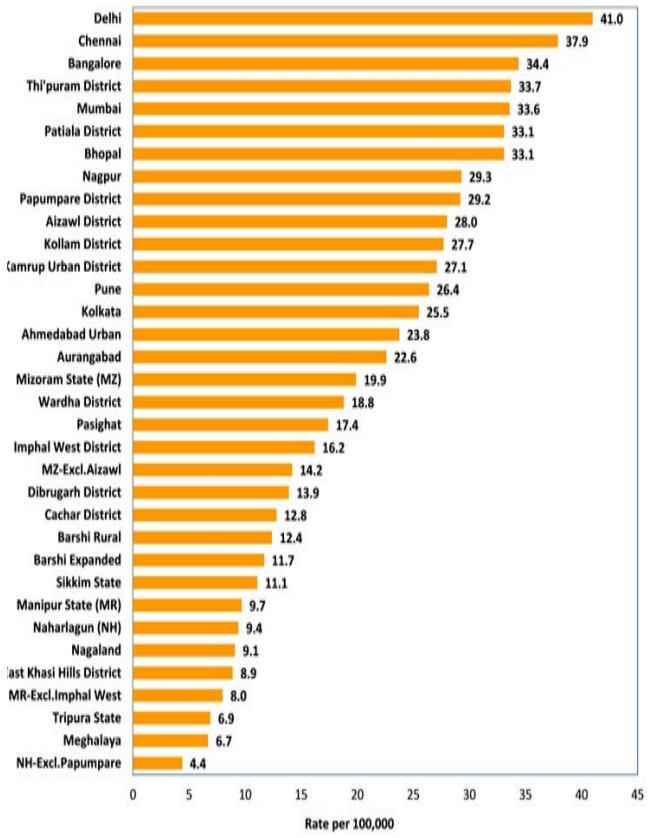

Figure 5. Breast Cancer Age Standardized Incidence Rates of India

4.2 Hospital Based Cancer Registry

Hospital-based cancer registries [28] maintain cancer patient's information. The main aim is to help patients by providing effective and useful information related to cancer and treatment provided to them. Hospital based cancer registry data can be utilized for epidemiological research. Cancer registries help in carrying out various research program by sharing information they collect for various research programs. Hospital based cancer registries are more reliable as compared to PBCR because HBCR mainly deals in maintaining patient record efficiently. Rajiv Gandhi Cancer Institute and Research center is the leading source of registration for Delhi Based Cancer Registry. As per Delhi Cancer Registry, AIIMS/ IRCH and RGCI reported 21.8 % & 11.0% of cancer incidence and mortality. As per RGCI report Breast cancer was top site with 18190 (29.09%) cases

whereas for cervix cancer 6030 (9.64%) cases were reported. The number of cases recorded in various HBCR and graphical representation for the same is represented in Figure 6 and Table 2 respectively which shows the maximum number of cases reported in Kottayam (40%) and least number of cases is registered in Bangalore with a percentage of 14.2. A total number of Breast Cancer cases registered were 18507(ICD:10: C50 ,1996-2015).

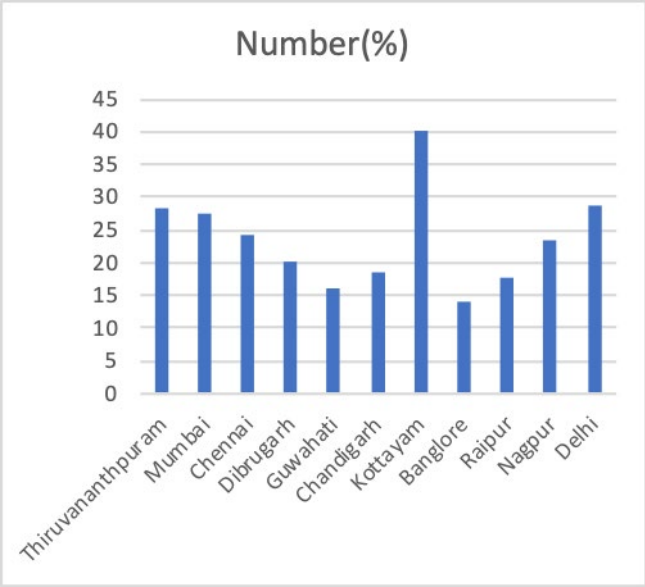

Figure 6. Number of cases registered in various HBCR in India

Table 2. Number of cases registered in various HBCR in India

Registry	Number (%)
Thiruvananthpuram	28.3
Mumbai	27.6
Chennai	24.3
Dibrugarh	20.1
Guwahati	16.1
Chandigarh	18.6
Kottayam	40
Bangalore	14.2
Raipur	17.9
Nagpur	23.4
Delhi	28.6

Breast cancer contributed 20.09% among all female in all age groups for different types of cancer. Table 3 shows the number of cases registered for different age groups for breast cancer from the year 1996-2015 which shows the maximum number of cases has been reported in age 45-54, Figure 7 shows graphical representational of the same. Maximum cases of breast cancer patients were registered in the premenopausal age group.

Table 3. Number of cases registered and % for different age groups.

Age group	No of patient	%
0-14	1	0
15-24	53	0.2
25-34	1154	6.2
35-44	3765	20.3
45-54	5859	31.6
55-64	4785	25.8
65-74	2262	12.2
75+	628	3

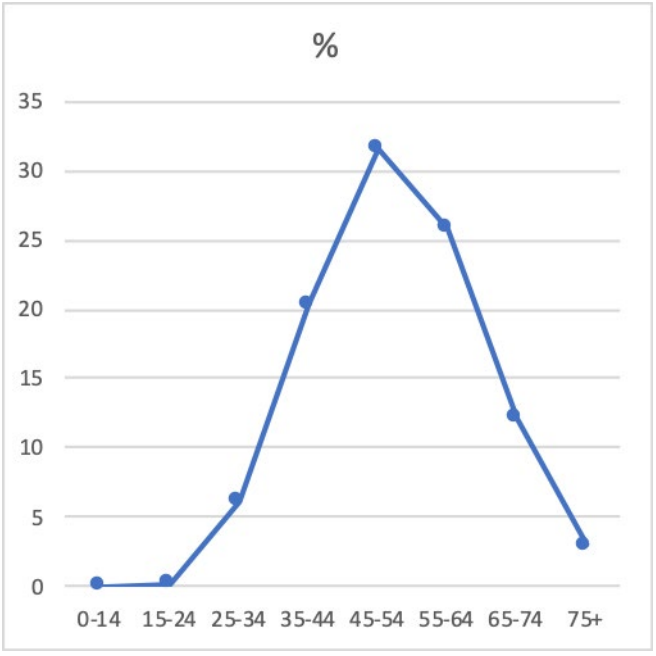

Figure 7. Age wise Group distribution

5. Discussion

The number of new cases has been increasing exponentially due to lack of awareness, inefficient treatment and last stage exposure of breast cancer. Data reports from different cancer registries Delhi, Mumbai, Chennai, Thiruvananthpuram, Dibrugarh, Guwahati, Chandigarh have been analyzed. In this study it has been observed that Delhi registry have low Mortality Incidence Ratio of 8.0 but it has high incidence whereas, in Barshi 66.3 Mortality Incidence Ratio reported which is high due to the small incidence of reporting of breast cancer.

There are various risk factors of Breast Cancer due to geographical variation. The high-risk factors are [29-38] early menarche, late menopause, if women conceive at late age, nulliparity, no breastfeeding, family with two or more first degree relative have breast cancer history, hereditary, excessive weight gain after postmenopausal, Hormone Replacement Therapy (HRT), smoking, exposure to low-dose radiation, excessive alcohol intake, oral contraceptive pills used for lifetime, higher BMI (Body Mass Index).

As per the report by ICMR (Indian Council of Medical Research) published by India-Today, the expected total number of new cancer cases would be around 14.5 lakh in 2016 and is likely to touch nearly 17.3 lakh new cases by 2020. Breast Cancer estimated 1.5 lakh (over 10 percent of all cancers)

6. Conclusion

The Breast Cancer cases has increased exponentially owing to absence of consciousness, inefficient treatment and last phase of breast cancer exposure. In this study trends in the epidemiology of breast cancer among multiple cancer registries located in India have been discussed. The study shows that women have elevated risk factors for breast cancer, owing to early menarche, late menopause, women conceiving in late age, nulliparity, no breastfeeding, family with two or more first degree relative having breast cancer history, hereditary, excessive weight gain after postmenopause, Hormone Replacement Therapy (HRT), excessive alcohol intake, oral contraceptive pills used for lifetime, higher Body Mass Index etc. It has been observed that maximum number of cases reported in the age of 45-54 which is 31.6 % of overall cases registered. As per report generated by Rajiv Gandhi Cancer Institute 29.09% of Breast cancer cases have been reported and 9.64% for cervix cancer. Indian females need to be conscious of risk factors for breast cancer to adopt suitable preventive procedures. There is an urgent call for efficient domestic and state-wide literacy programs, awareness-raising programs and ongoing medical seminars to improve breast cancer literacy. These cancer incidence estimates indicate an urgent need to reinforce and boost current diagnostic / treatment facilities, which are inadequate and unable to deal with the current burden of cancer in India.

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