



Descriptive epidemiology of female breast cancer in Gurugram, India

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Abstract

Background: Breast cancer is the most frequently diagnosed cancer in females worldwide. The Hospital Based Cancer Registry data of FMRI, Gurugram were here used to describe the epidemiology and trends in breast cancer incidence in Gurugram.

Methods: The time trend of breast cancer incidence was evaluated by using the HBCR data from 2013-2019.

Results: A total of 3132 breast cancer cases were registered in 2013 - 2019, 62 (2.0%) in males and 3070 (98.0%) in females. Breast cancer was the leading site of cancer in females accounting for 3070 (28.9%) of cases with a median age of 50 years. Age specific incidence rates increased with age and attained a peak in the 40-64 (67.2%) years of age group of all cases.

Conclusions: The Breast, was the most common cancer site among women from 2013 to 2019 in Gurugram. A similar trend has also been noted for other metropolitan cities viz. Bangalore, Bhopal and Chennai. Though the age-specific incidence rates (ASR) in these cities 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, hospital based cancer registry, incidence, trends, epidemiology

Introduction

Cancer of the breast in women is a major health burden worldwide. It is the most common cause of cancer among women in both high-resource and low-resource settings, World Health Organization. The GLOBOCAN 2020 estimates of cancer incidence produced by the International Agency for Research on Cancer. ^[1] Worldwide, an estimated 19.3 million new cancer cases (18.1 million excluding no melanoma skin cancer) and almost 10.0 million cancer deaths (9.9 million excluding no melanoma skin cancer) occurred in 2020. Female breast cancer has surpassed lung cancer as the most commonly diagnosed cancer, with an estimated 2.3 million new cases (11.7%) followed by lung (11.4%), colorectal (10.0 %), prostate (7.3%) and stomach (5.6%) cancers. Overall incidence was from 2-fold to 3-fold higher in transitioned versus transitioning countries for both sexes, whereas mortality varied <2-fold for men and little for women. In India, although age adjusted incidence rate of breast cancer is lower (25.8 per 100 000) than United Kingdom (95 per 100 000) but mortality is at par (12.7 vs. 17.1 per 100 000) with United Kingdom. ^[2] There is a significant increase in the incidence and cancer-associated morbidity and mortality in Indian subcontinent as described in global and Indian studies. ^[3-7] Earlier cervical cancer was most common cancer in Indian woman but now the incidence of breast cancer has surpassed cervical cancer and is leading cause of cancer death, although cervical cancer still remains most common in rural India. ^[8] Multiple

sources from literature were used for gathering information and analysis of breast cancer. Information on crude rate (CR) and age adjusted rate (AAR) per 100 000 populations was collected from National Cancer Registry Program reports 2012–2014 and twenty-five population-based cancer registries (PBCRs) across India (Bangalore, Barshi rural and expanded, Bhopal, Chennai, Delhi, Mumbai, Ahmedabad rural and urban Aurangabad, Thiruvananthapuram) including North-East states (Cachar District, Aizawl District, Dibrugarh District, Kamrup Urban District, Manipur State, Mizoram State, Imphal). ^[9]

The objective of this review article is to bring together the information scattered in different Indian registries and studies to see a broader picture of breast cancer epidemiology in Indian subcontinent. A descriptive analysis is used to report pattern, incidence and trends of breast cancer among Gurugram women.

Search and Selection Criteria

We searched PubMed, Scopus, Google Scholar and references from relevant articles using the search terms “Breast Malignancies”, ‘India’, ‘epidemiology’ and ‘incidence’. We also accessed the website of the International Agency for Cancer Research and reviewed all the online databases ‘GLOBOCAN’, ‘Cancer Incidence in Five Continents’ and other publications containing information on cancer in India. ^[1]

Statistical Analysis

Collected Data was analyzed using Statistical Package for Social Sciences (SPSS) version 23.0. The statistical methods applied include and cross tabulations such as frequency counts, percentage, mean and Chi-square test were applied to identify relationship between variables.

Materials and Methods

This was a cross-sectional, descriptive prevalence study conducted within the referral facility for this micro-region of the city of Gurugram, Haryana, India. Breast cancer was defined using code C50 from the International Classification of Disease-Revision, 10th edition. The data with a primary tumor of the site breast (C50.0 - C50.9), whether still alive or deceased collected by the Hospital Based Cancer Registry (HBCR) was utilized for this study during the 7-year period beginning January 1, 2013 and ending December 31, 2019 were registered. All the recorded data details are entered in Microsoft Excel data sheet. The information collected is cross-checked for completeness. The data is checked and validated by using quality control

programs/tools for cancer registries of International Agency for Research on Cancer (IARC) for avoiding duplication and any unlikely combination of age, sex, site and morphology and other factors in the data base. All neoplasms with a behavior code of 3 as defined by the International Classification of Diseases for Oncology, 3rd Edition, and the International Statistical Classification of Diseases and Related Health Problems (10th revision; ICD-10) were considered reportable and therefore registered Registry. [10] Information on other variables was coded according to the international guidance. [11]

Results

During 2013 to 2019, a total of 23,600 of new cancer cases were registered. Of these 3132 (13.3%) primary breast cancer was registered. The incidence of breast malignancies increased yearly between 2013 and 2019. A female predominance was observed in the incidence of breast malignancies (n= 3070, 98.0%) as compared to males (n= 62, 2.0%) (Table 1 & Fig.1).

Table 1: Distribution of total number of new cancer cases versus all breast cancer cases by sex, period: 2013-2019

Years	New Registration (All sites)				Breast cancer cases				% Breast cancer cases between all cases		
	Male	Female	Total	%	Male	Female	Total	%	Both Sex (3132/23600)	Female (3070/23600)	Female (3070/10620)
2013	832	658	1490	6.3	2	207	209	6.7	0.9	0.9	1.9
2014	1191	966	2157	9.1	6	301	307	9.8	1.3	1.3	2.8
2015	1888	1587	3475	14.7	9	443	452	14.4	1.9	1.9	4.2
2016	2013	1685	3698	15.7	9	455	464	14.8	2.0	1.9	4.3
2017	2381	1947	4328	18.3	7	528	535	17.1	2.3	2.2	5.0
2018	2351	1874	4225	17.9	8	565	573	18.3	2.4	2.4	5.3
2019	2324	1903	4227	17.9	21	571	592	18.9	2.5	2.4	5.4
Total (2013-2019)	12980	10620	23600	100.0	62	3070	3132	100.0	13.3	13.0	28.9
%	55.0	45.0	100.0		2.0	98.0	100.0				

The Chi-square statistics is 3111.0295. The p-value is <0.00001. Significant at p<0.05

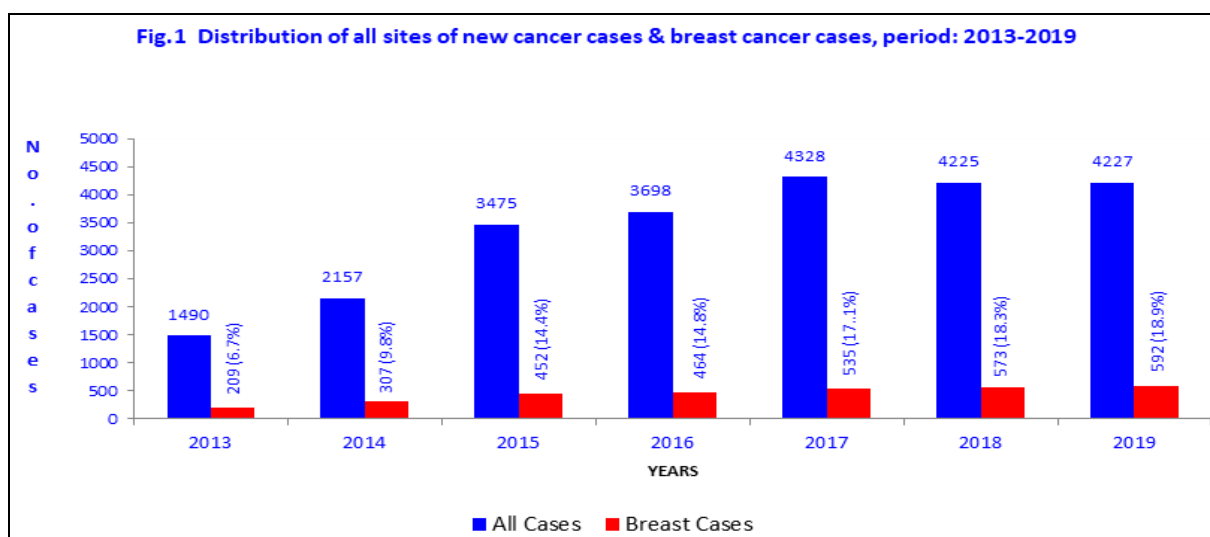


Fig 1

Table 2 & Fig. 2 show the age-specific incidence in general found to increase with age. The incidence is low (n=7; 0.2%) in younger ages (<25 years) and then began to rise rapidly starting with women 25-29 years and peaked at 55-59 years with a proportion of 15.8% females. The

incidences of breast cancer cases are more common in middle adults of age 40-59 years (n=1646; 53.7%) with the median age of these cases were 50 years followed by geriatric age 61+ years (n=993; 32.3%) and young adults <40 years (n= 431; 14.0%).

Table 2: Distribution of breast cancer patients within various age groups in Females, Period: 2013-2019

Age groups	2013	2014	2015	2016	2017	2018	2019	2013-2019	
	No.	No.	No.	No.	No.	No.	No.	No.	%
00-04	0	0	0	0	0	0	0	0	0.0
05-09	0	0	0	0	0	0	0	0	0.0
10-14	0	0	0	0	0	0	0	0	0.0
15-19	0	0	0	1	0	1	0	2	0.1
20-24	0	0	1	0	2	0	2	5	0.2
<25	0	0	1	1	2	1	2	7	0.2
25-29	6	3	7	9	6	9	6	46	1.5
30-34	9	14	30	23	32	25	27	160	5.2
35-39	15	20	24	39	41	42	37	218	7.1
<40	30	37	62	72	81	77	72	431	14.0
40-44	18	30	49	49	53	63	56	318	10.4
45-49	20	46	68	48	66	73	82	403	13.1
50-54	33	44	60	72	85	82	65	441	14.4
55-59	35	50	62	72	86	84	95	484	15.8
40-59	106	170	239	241	290	302	298	1646	53.7
60-64	34	44	59	56	67	80	75	415	13.5
65-69	17	23	39	35	90	50	60	314	10.2
70-74	8	12	21	25	0	32	41	139	4.5
75+	12	15	23	26	0	24	25	125	4.1
60+	71	94	142	142	157	186	201	993	32.3
All Ages	207	301	443	455	528	565	943	3070	100.0
All Sites	658	966	1587	1685	1947	1874	1903	10620	

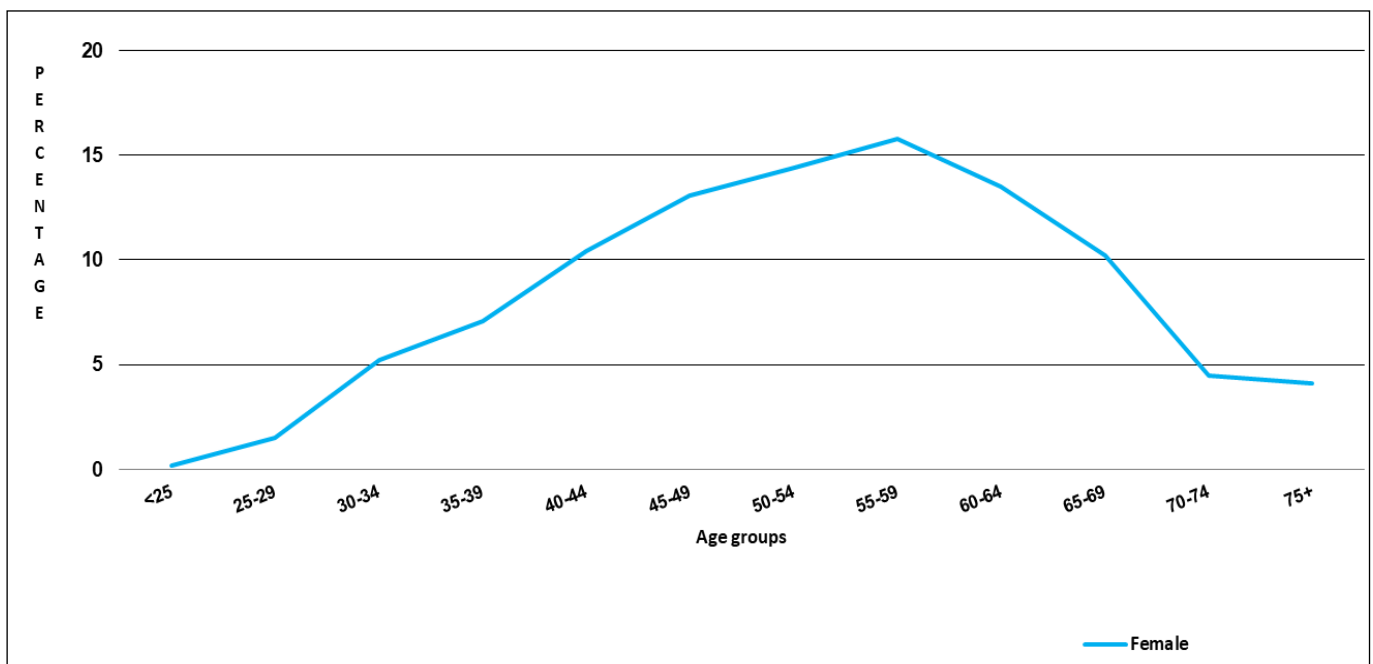
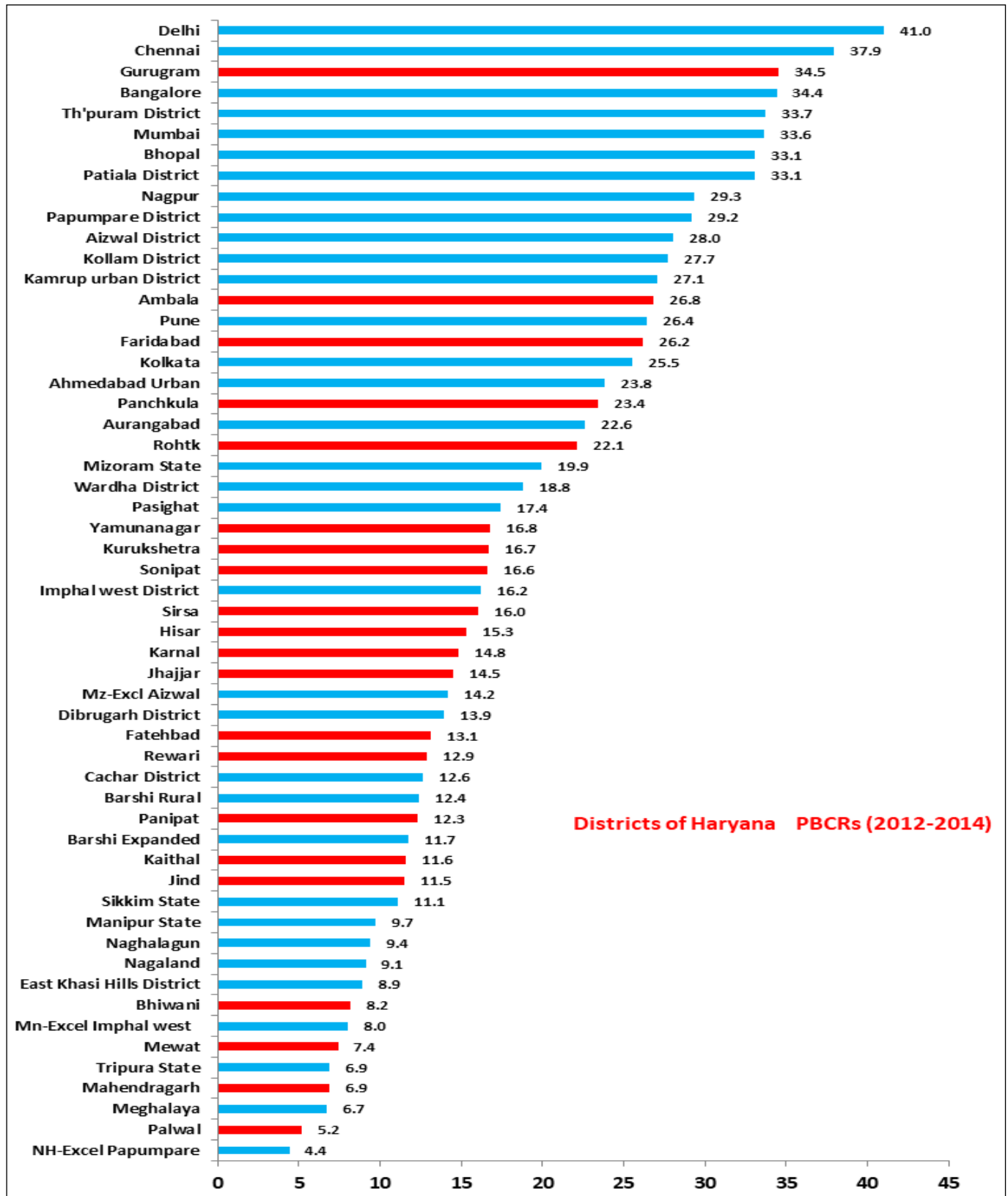


Fig 2: Age specific proportions of breast cancer in female, Period: 2013-2019

The bar chart shown in Figure 3 gives the district wise national comparisons of Breast Cancer by Age-Adjusted incidence rates per 100 000 persons (AAR) with Indian PBCRs functioning under the National Centre for Disease Informatics and Research (NCDIR)-National Cancer Registry Programme (NCRP), Indian Council of Medical Research (ICMR). [12] The district of state of Haryana (higher of AAR between 2016-2017) displayed in dark red colour shading and 27 PBCRs (average annual of 2012-14)

in order from the highest AAR of breast cancer in females displayed in light blue colour. Districts with AAR are labelled with vales of AARs in parenthesis. Breast cancer Age-Adjusted incidence rate (AAR) among all the PBCR’s top ten places were occupied by Delhi with AAR 41.0 (per 100 000), Chennai (37.9) Gurugram (34.5), Bangalore (34.4), Thiruvananthapuram (33.7), Mumbai (33.6), Bhopal (33.1), Patiala (33.1), Nagpur (29.3) and Papumpare District (29.2).



Source: Two-Year Report of the Development of an Atlas of Cancer in Haryana State, National Centre for Disease Informatics and Research (NCDIRP), Indian Council of Medical Research (ICMR). Bengaluru, India, 2020.

Fig 3: District wise comparison of Breast Cancer by Age-Adjusted incidence rates with Indian PBCRs under NCDIR, Sex-Female

Table 4: depicts the descriptive statistics of the incidences of female breast cancer during 2013-2019 i.e. frequency of breast cancer cases by: - Marital status, Laterality, Clinical Extent of Disease (CED), Type of Treatment Modalities given at Reporting Institute (RI) and the Histological Classification of disease according to the World Health Organization classification in a female population sample at

the Fortis Memorial Hospital, Gurugram, Haryana, India, 2013-2019. Overall, the married cases were 2643 (86.1%), right laterality (n=973, 31.7%), left laterality (n=949, 30.9%), Clinical Extent of Diseases under the localised category breast cancer cases were (n=2350, 76.5%). Breast cancer treatment can be highly effective, especially when the disease is identified early. Treatment of breast

cancer often consists of surgical removal or radiation therapy or medication (hormonal therapy, chemotherapy and/or targeted biological therapy) or a combination of either two or all three modalities, to treat the cancer including microscopic disease that may have spread from the breast tumor. Such treatment, which can prevent cancer growth and spread, thereby saves lives. Treatment given at the reporting institute were available for those patients who received surgery, chemotherapy, radiation, hormonal therapy or immunotherapy. The vast majority of patients underwent chemotherapy with combination (n=1022, 65.8%), surgery with combination (n=655, 42.2%) and radiation with combination (n=606, 39.0%). The distributions of breast cancer sub-types in women, the most common histo-pathological sub-types of breast cancer were

Carcinomas, NOS (ICD-O: M-8010, n=1757, 57.3%) followed by Infiltrating duct carcinoma, NOS (ICD-O: M-8500, n=1147, 37.4%), Neoplasms, Malignant tumor, NOS (ICD-O: M-8000, n=68, 2.2%), Adenocarcinoma, NOS (ICD-O: M-8140, n=47, 1.5%), Lobular carcinoma (ICD-O: M-8520, n=16, 0.5%), Mucinous adenocarcinoma (ICD-O: M-8480, n=11, 0.3%), Phyllodes tumor, malignant (ICD-O: M-9020, n=6, 0.2%), Papillary carcinoma (ICD-O: M-8050, n=4, 0.1%), Squamous cell carcinoma, NOS (ICD-O: M-8070, n=3, 0.1%) & Carcinosarcoma (ICD-O: M-8980, n=2, 0.1%). There are other, less common, types of breast cancers (n=9, 0.2%), too, such as Cribriform carcinoma, Solid Carcinoma, Medullary carcinoma, Inflammatory carcinoma, Paget's disease, Metaplastic carcinoma & Hemangiosarcoma.

Table 4: Descriptive statistics for the incidences of female breast cancer during 2013-2019

Patient characteristics		Nos.	%	
Married		2643	86.1	
Laterality	Right	973	31.7	
	Left	949	30.9	
Clinical Extent of Disease		Localised	2350	
Type of treatment modalities received at RI with Surgery/ Chemotherapy/ Radiotherapy with combination	Surgery	655	42.2	
	Radiotherapy	606	39.0	
	Chemotherapy	1022	65.8	
Histological classification of disease	ICDO	Morphology		
	8010	Carcinoma, NOS	1757	57.3
	8500	Infiltrating duct carcinoma, NOS	1147	37.4
	8000	Neoplasm, Malignant Tumor, NOS	68	2.2
	8140	Adenocarcinoma, NOS	47	1.5
	8520	Lobular carcinoma, NOS	16	0.5
	8480	Mucinous adenocarcinoma	11	0.3
	9020	Phyllodes tumor, malignant, Cystsarcoma Phyllodes	6	0.2
	8050	Papillary carcinoma	4	0.1
	8070	Squamous cell carcinoma, NOS	3	0.1
	8980	Carcinosarcoma	2	0.1
	Others	9	0.2	

Discussion

In our study, breast cancer was overall the most common cancer in females (28.9%). We found that the breast cancer cases increased by threefold from 2013 to 2019 (209 to 592). A high proportion (53.7%) of breast cancer was observed in the middle aged group (40-59 years) with peak (15.8%) of cases in the age group of 55-59 years, with the median age of these cases were 50 years, which highlights the need for raising awareness of this disease in the community. There have been several studies examining the similar trend among women in developed and developing countries to that of our study. Breast cancer is the most common cancer in women in India and accounts for 27% of all cancers in women. [1] Overall, 1 in 28 women is likely to develop breast cancer during her lifetime. In urban areas, 1 in 22 women develops breast cancer during her lifetime as compared to rural areas where 1 in 60 women develops breast cancer in her lifetime. [9] Similarly, Manoharan N, Nair O, *et al.*, 2017 [16] published a study from Delhi 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 Leong *et al.*, 2010, Yip, 2009, Toi *et al.*, 2010 [17] the median age of Western countries is in the age range of 50-55 years. Youlden *et al.*, 2012 [18,19] 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. United Nations, 2010 [20] 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. Incidence rates of breast cancer are rising fast in transitioning countries in South America, Africa [13] and Asia [14] as well as in high-income Asian countries (Japan and the Republic of Korea) [15] where rates are historically low. Dramatic changes in lifestyle, sociocultural, and built environments brought about by growing economies and an increase in the proportion of women in the industrial workforce have had an impact on the prevalence of breast cancer risk factors the postponement of childbearing and having fewer children, greater levels of excess body weight and physical inactivity and have resulted in a convergence toward the risk factor profile of western countries and narrowing international gaps in breast cancer morbidity. The association between socio-economic status and risk of breast cancer is well established, with women in higher socio-economic groupings being at higher risk. When social class is measured by income or education level, the variations in risk largely accord with the differential distribution of known risk factors, as observed in the USA. [21]

Limitations

This study was a hospital based study and hence, does not represent the true rate of events in the general population. Further hospital-based and community-based cohort studies are recommended in order to further explore the highlights of incidence of breast cancer in the general population.

Conclusion

The present study only highlights the status of breast cancer morbidity in a tertiary care hospital. This is the first study amongst admitted/OPD patients. In future the burden of breast cancer incidence shows an urgent need for strengthening and augmenting the existing diagnostic/treatment facilities, which is inadequate and unable to handle the current load of cancer in India.

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Availability of Data and Material

Available

Code Availability

Available

Author's Contribution

All authors have nearly equal contribution

Ethics Approval

Not applicable

Declaration of Competing Interest

None (for all authors)

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