Status of Ovarian Cancer in India (2012-14)

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Abstract

Background: According to latest report of NCRP, after Breast and Cervix cancer, it is the Ovarian cancer which constitutes the third most common cancer among women of India.

Objectives: The present paper explores the incidence rates, age specific rates, methods of diagnosis and types of treatments reported from all the 27 Population Based Cancer Registries of India.

Material and Methods: The cancer incidence data collected by 27 Population Based Cancer Registries (PBCRs), working under the network of NCRP over the period of 2012-14 was considered for the study purposes. All the Ovarian cancer cases reported from the above registries formed the source of data for the present study.

Results: There were 4818 number of Ovarian cancer cases which were registered from all the selected registries during the period 2012-14. The number of cases varied from 15 cases in Nagaland to 688 cases in the registry of Delhi. The % contribution to total cases, ranged from 2.4% in Meghalaya to 8.9% in the registry of Dibrugarh. The mean AAR and mean % contribution of cases to total were observed to be 5.3 per 100,000 and 5.9%, respectively. In majority of the registries, the Ovarian cancer ranked as 3rd most common cancer. About 50% of the total cases occurs between 45 - 65 years of age. The age specific incidence rates increases sharply with every ten years rise after the age of 35 years. In 84.2% of the cases the mode of identification was microscopic. The most preferred type of treatment was surgery plus chemotherapy (56.2%). It is estimated that in India by the year 2020, the incidence of Ovarian cancer cases will be around 36200 and the prevalent cases will be around 100,000. Early detection of cases and provision of early treatment of cases may go a long way to reduce the prevalence of Ovarian cancer cases in India.

Conclusion: Ovarian cancer constitutes 3rd most common cancer and contributes to about 6% of total cancer cases among the Indian women. The preferred type of treatment was found to be Surgery plus Chemotherapy.

Keywords: Ovarian Cancer; Age Adjusted Rate; % Contribution; Rank; Percentiles

Background

The National Cancer Registry Programme (NCRP) at Bangalore, India, is a long-term activity of the Indian Council of Medical Research. It is receiving data continuously on cancer incidence cases from the 27 Population Based Cancer Registries, shortly termed as PBCRs. The data so received for incidence cases are then analyzed and expressed in the form of various rates like the crude rate, age specific rates and the truncated rates and presented as period reports. According to latest report of NCRP, after Breast and Cervix cancer, it is the Ovarian cancer which constitutes the third most common cancer among women of India [1]. A previous study has shown that in India by 2020, there will be around 36200 new cases of Ovarian cancer [2].

Objectives of the Study

The present paper explores the incidence rates, age specific rates, methods of diagnosis and types of treatments reported from all the 27 Population Based Cancer Registries of India.

Materials and Methods

The cancer incidence data collected by 27 Population Based Cancer Registries (PBCRs), working under the network of NCRP over the period of 2012-14 was considered for the study purposes [1]. All the Ovarian cancer cases reported from the above registries formed the source of data for the present study. The following information related to Ovarian cancer cases were noted and utilized for further analysis: Number 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. The information related to the type of treatments provided to Ovarian cancer cases are taken from the Hospital Based Cancer Registry Report of 2012-14 [3]. The definition of AAR and Age Specific Rates can be seen in the old report of NCRP [4].

The frequency distribution of AAR, % of total cases and Ranks in respect of the Ovarian cancer cases were obtained for all the 27 cancer registries and later summarized by providing information on median AAR, Mean AAR, SD and range seen over the registries. The percentage age distribution of all the cases of 27 registries was obtained by considering the following age groups in years: < 15, 15 - 24, 25 - 34, 35 - 39, 40 - 44, 45 - 49, 50 - 54, 55 - 59, 60 - 64, 65 - 69, 70 - 74, 75+. 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 Ovarian cancer, the cumulative frequency distribution was obtained. From the cumulative frequency distribution, the percentile age distribution was found out and the values corresponding to 5th, 10th, 25th, 50th, 75th and 90th percentiles are calculated using the formula: $P(n) = l + \{[(N*n/100) - C] * h / f\}$ where l = lower limit of percentile class; N = Total cases; n = percentile value (say, 10, 25, 50, 75, 90, 95); C - cumulative frequency; h - Width of the frequency class; f - frequency of the percentile class.

The age specific rates are also obtained for the above age groups using the formula: $n*100000/N$ where n is the number of incidence cases for the ith five yearly age group and N is estimated population of the same age group.

Method of diagnosis is an important indicator of quality of the data collected. The information on Method of diagnosis was shown for top 10 registries with maximum cases by the following categories: Microscopic; X-ray/Imaging; Clinical; Others. The information regarding types of treatment was collected in the following categories. Surgery (S), Radio-therapy (R), Chemo-therapy (C), S+R, S+C, R+C, S+R+C and others.

Results

The selected information such as No. of cases, AAR, % of cases and rank related to Ovarian cancer cases of 27 cancer registries of India is presented in table 1. There are 4818 number of Ovarian cancer cases which are reported from the selected registries during the period 2012-14. The number of cases varied from 15 cases in Nagaland to 688 cases in the registry of Delhi. In terms of percentage contribution

Cancer Registry	Number of Cases	AAR	% of total cases	Rank
Delhi	688	10.0	7.2	4.0
Kamrup	131	8.7	5.5	5.0
Bhopal	136	8.4	7.8	3.0
Chennai	409	8.2	6.6	3.0
Mumbai	468	8.1	6.9	3.0
Pasighat	12	8.1	7.6	4.0
Kolkata	203	8.0	7.8	3.0
Thiruvananthapuram	468	7.0	5.9	4.0
Naharlagun	48	6.7	6.8	6.0
Dibrugarh	120	6.5	8.9	4.0

Bangalore	240	6.5	5.3	3.0
Pune	273	6.3	7.4	3.0
Nagpur	152	6.0	6.3	3.0
Patiala	155	5.5	4.9	4.0
Kolam	292	5.4	5.3	4.0
Sikkim	40	4.9	5.9	6.0
Aurangabad	69	4.7	6.2	3.0
Wardha	94	4.4	6.6	3.0
Cachar	106	4.1	5.1	5.0
Ahmedabad	220	4.0	5.3	3.0
Mizoram	56	3.7	2.7	7.0
Manipur	146	3.5	5.7	5.0
Tripura	164	3.2	6.1	4.0
Barshi-Rural	22	2.9	4.6	3.0
Barshi-Exp	52	2.3	4.6	3.0
Meghalaya	39	2.1	2.4	8.0
Nagaland	15	1.7	2.8	10.0

Table 1: *Age adjusted rate (AAR), % of total cases and rank of ovarian cancer in different registries of India (2012-14).*

to total cases, it ranged from 2.4% in Meghalaya to 8.9% in the registry of Dibrugarh. When considered rank, it ranged between 3 and 10.

AAR, percentage of total cases and rank

The Frequency distribution of AAR, % of total cases and Rank of Ovarian cancer in 27 Cancer Registries of India (2012-14) along with the Summary statistics is shown in table 2. The mean and median AAR are observed to be 5.5 and 5.6 respectively. Similarly, for the % contribution of cases to total, the mean and median remained same and is 5.9%. Based on median rank, it can be said that Ovarian cancer ranked 4th most common cancer among women in India.

AAR Per 100,000		% Contribution to total		Rank	
Class Interval	Number	Class Interval	Number	Value	Number
≤ 3.0	4	≤ 3.0	3	3	12
3.0 - 3.9	3	3.0 - 3.9	-	4	7
4.0 - 4.9	5	4.0 - 4.9	3	5	3
5.0 - 5.9	2	5.0 - 5.9	8	6	2
6.0 - 6.9	5	6.0 - 6.9	7	7	1
7.0 - 7.9	1	7.0 - 7.9	5	8	1
8.0 - 8.9	6	8.0 - 8.9	1	-	-
9.0 - 10.0	1	9.0 - 10.0	-	-	-
Median	5.5		5.9		4
Mean	5.6		5.9		4.3
SD	2.26		1.58		1.77
Range	1.7 - 10.0		2.4 - 8.9		3.0 - 10.0

Table 2: *The frequency distribution of AAR, % of total cases and rank of ovarian cancer in 27 cancer registries of India (2012-14).*

Percentage age distribution

The Percentage age distribution of cases for 27 Cancer Registries of India is shown in figure 1. About 50% of the total cases occurred between 45 - 65 years of age. About 5% of the total cases were reported before the age of 25 years. Also, more than 20% of the cases were reported beyond the age of 65 years.
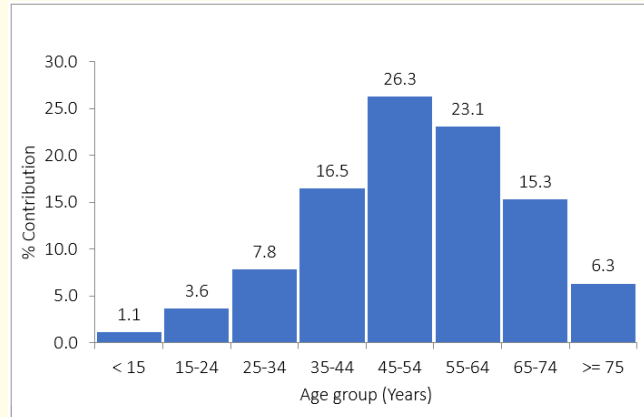

Figure 1: Percentage age distribution of cases in 27 cancer registries of India-ovarian cancer (C56).

Percentile age distribution

The Percentile Age distribution of Cases for 27 Cancer Registries of India is shown in table 3. The 10th percentile age was 31.8 years which means that about 10% of the total cases occurred by the age of 32 years. Similarly, the 25th percentile age was observed to be 43 years implying that about 25% of the cases occurred by the age of 43 years. The median age was 53 years again implying that 50% of the total cases occurred by the age of 53 years. The 95th percentile age being 77 years indicates that 5% cases even occurred beyond the age of 77 years.

Percentile	5	10	25	50	75	90	95
Age (Years)	25.8	31.8	42.6	53	63.9	65.8	77.1

Table 3: Percentile age distribution of cases in various registries of India.

Age specific rates

The Age Specific Rates of Cases calculated for 27 Cancer Registries of India is shown in table 4. Ovarian cancer is not common before the age of 35 years. However, the age specific incidence rates increases sharply with every ten years rise after the age of 35 years. The higher age specific incidence of cancer (22.7) was seen in the age group of 65 - 74 years. The next higher age specific incidence (19.2) was observed in the age group of 55 - 64 years. The age specific incidence was even higher (17.3) beyond the age of 75 years.

Age gr	< 15	15 - 24	25 - 34	35 - 44	45 - 54	55 - 64	65 - 74	>= 75
ASR	0.3	1.1	2.5	6.5	14.4	19.2	22.7	17.3

Table 4: Age-specific rates for Ovarian cancer over all cancer registries.

Method of diagnosis

The Method of diagnosis practiced for identification of Ovarian cancer in top 10 Indian Cancer Registries, with maximum number of cases, is shown in table 5. The data pertains to 2884 cases. When pooled for all registries, the microscopic identification was in 84.2% of the cases followed by 6.2% by X-ray/Imaging. The microscopic identification % varied between 76.4% in Kolkata to 91.5% in Tripura. The clinical identification of cases was observed in 4.8% of the cases.

Registry	Microscopic	X-ray/Imaging	Clinical	Others	Total cases
Delhi	85.8	7.4	5.2	1.6	590
Mumbai	80.6	1.3	8.3	9.8	377
Thiruvananthapuram	88.0	12.0	-	-	412
Chennai	78.7	10.8	5.1	5.4	322
Kollam	87.0	13.0	-	-	254
Pune	79.9	0.7	13.6	5.8	218
Bangalore	89.2	0.8	1.7	8.3	214
Ahmedabad	87.3	0.9	11.4	0.4	192
Kolkata	76.4	1.5	-	22.1	155
Tripura	91.5	5.5	0.6	2.4	150
Pooled	84.2	6.2	4.8	4.8	2884

Table 5: *Method of Diagnosis for Ovarian Cancer in top 10 cancer registries with maximum cases.*

Types of treatment

The types of treatment by selected Hospital Based Cancer Registries based on 562 patients is shown in table 6. A variation was observed in the types of treatment provided by different registries. Based on the pooled data, about 56.2% of the cancer patients are provided with the combination of surgery and Chemo-therapy followed by chemo-therapy (20.0%) and surgery (19.0) alone.

Registry	Bangalore	Chennai	Delhi	Mumbai	Pooled
S	18.4	6.7	15.6	23.4	18.0
R	1.5	-	1.3	0.8	0.9
C	6.6	27.5	49.3	16.4	20.6
S+R	2.2	-	1.3	0.8	1.1
S+C	64.8	63.8	29.9	56.6	56.2
R+C	5.1	1.0	-	0.4	1.6
S+R+C	-	-	2.6	1.2	0.9
Others	0.7	1.0	-	0.4	0.5
Unknown	0.7	-	-	-	0.2
Numbers	136	105	77	244	562

Table 6: *Type of treatment* by selected registries - (2012-14).*

*: Based on Hospital Based Cancer Registry data.

Discussion

Ovarian cancer ranks mostly as 3rd or 4th most common cancer In India. The first two leading sites of cancers being Breast and Cervix [5]. Among 27 cancer registries, the mean AAR of Ovarian cancer was found to be 5.6 per 100,000 population. The Ovarian cancer cases contribute to around 5.9% of the total cancer cases in India. The Percentile distribution of age for Ovarian cancer is another way of examining the spread of cancer with age. The maximum number of cases (26.3%) being observed between the ages 45 - 54 years. About 10% of the cases are observed to be occurring by the age of 32 years and 50% by the age of 53 years. Considering the Age Specific Rates, 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 the age of 25 years, with the advancement of every ten years, the age-specific rates starts increasing sharply and ultimately reached to the level of 22.7 per 100,000 in women above 65 years.

In case of Ovarian cancer, a combination of therapies were in use rather than single therapy. More than surgery (18.0%) or Chemotherapy (20.6%), their combination was in use. Thus, the most preferred type of treatment was surgery plus chemotherapy (56.2%). It may be mentioned here that the registries are not reporting any information related to sign, symptoms or causes of cancers. Some of the common sign and symptoms that are reported in literature and are found to be associated with Ovarian cancer are: Abdominal bloating or swelling, Quickly, feeling full when eating, Weight loss, discomfort in the pelvis area, A frequent need to urinate [6]. The risk factors that are identified in literature are: Old age (50 - 60 years), Family history of ovarian cancer and inherited gene mutations. By family history it is meant that People with two or more close relatives with ovarian cancer have an increased risk of the disease [6,7].

A small percentage of ovarian cancers that are caused by gene mutations generally inherited from the parents. The genes known to increase the risk of ovarian cancer are called breast cancer gene 1 (BRCA1) and breast cancer gene 2 (BRCA2). These genes also increase the risk of breast cancer [6]. In our data when we attempted a correlation between breast cancer and ovarian cancer AARs, we found a high, significant correlation of 0.71 (P < 0.01). This correlation may be due to common factor of gene mutations. Any case, there is need to study in detail why there exist a correlation between the Age Adjusted Rates of breast cancer and ovarian cancer?

It is estimated that in India by the year 2020, the incidence of Ovarian cancer cases will be around 36200 and the prevalent cases will be around 100,000 [2]. Early detection of cases and provision of early treatment of cases may go a long way to reduce the prevalence of Ovarian cancer cases in India.

Conclusion

The study pertains to 4818 Ovarian cancer cases reported from 27 cancer registries of India. The number of cases varied from 15 cases in Nagaland to 688 cases in the registry of Delhi. In terms of percentage contribution to total cases, it ranged from 2.4% in Meghalaya to 8.9% in the registry of Dibrugarh. When considered rank, it ranged between 3 and 10. About 50% of the total cases occurred between 45-65 years of age. The median age was found to be about 53.0 years. The age specific incidence rates increases sharply with every ten years rise after the age of 35 years. In 84.2% the cases, the sources of identification was microscopic. Based on the pooled data, about 56.2% of the cancer patients are provided with the combination of surgery and Chemo-therapy followed by chemo-therapy (20.0%) and surgery (19.0) alone. At India level, it is estimated that around 36200 cases will be there. Early detection of cases and provision of early treatment of cases may go a long way to reduce the prevalence of Ovarian cancer cases in India.

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