

Epidemiology of ovarian cancers at a tertiary cancer hospital, Hyderabad

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Abstract

Ovarian cancer is the worst gynaecological cancer for women worldwide. With 1433 cases (26 per cent) overall during the study period, ovarian cancer was the second most common gynaecological malignancy at BIACH&RI. Ovarian cancer incidences marginally increased across the study period, with the highest percentage of 28.90% occurring in 2020. The largest percentage of instances occurred in the age group 51–60 years, with 31.5 per cent, followed by 41–50 years 24.3%, 61–70 years 21.5%, 31–40 years 10%, 71–80 years 6.5%, 21–30 years 4.1%, 11–20 years 1.2%, and 81–90 years 0.7%. One sex cord tumour was found at the age of one. Half of the instances included women who had gone through menopause. People between the ages of 41 and 70 account for about 77% of cases. The patient's mean age at diagnosis of ovarian malignancy was 52.5 ± 3.14 years. Stage III was the most common stage of ovarian cancer detection, accounting for 539 instances, followed by stage IV with 315 cases, stage I with 79 cases, and stage II with 36 cases. Stage I had a mean diagnosis age of 44.11 years, Stage II of 47.5 years, Stage III of 55 years, and Stage IV of 53 years. Nearly 49% of instances are MAHIG, with the remainder being LIGL (42%), and LIGNL (9%). Comparing patients with different gynaecological cancers, those with ovarian cancer had the highest rate of nulliparous condition (18.2 %). 941 people reported having stomach symptoms such as lumps, pain, discomfort, or distension. 25% of cases have spread to other body regions. The disease's emergence was the cause of all 31 hospital deaths (2%), which occurred. Concerning infertility, seven people are present. Ovarian cancer can run in families, as evidenced by the fact that 56 of the patients (4%) had a family history of various cancers, including malignancies of the reproductive tract.

Keywords: Ovarian cancer, epidemiology, stage of diagnosis.

Introduction

The seventh most frequent malignancy worldwide is ovarian cancer. (The age-standardized mortality rate is 4.0/100,000). According to Globocan 2020 estimates by country, the number of new cases in 2020 was 313959, and the number of deaths was 207252. In India, new cases reported in 2020 are 45701. It is anticipated that ovarian cancer will affect 371,000 people annually by 2035 (an increase of

55%) and cause 254,000 deaths globally (an increase of 67%). (1) In the USA, ovarian cancer accounts for just 2.5% of all female cancer cases but leads to 5% of cancer deaths. This explains the low survival of the disease. In China, ovarian cancer is the tenth most frequent cancer among women. (2) The incidence of female cancers, particularly ovarian cancer, is rising in India as well. The estimated age-adjusted incidence varies from 0.9 – 8.4 per 100,000 women in various population-based cancer registries in

India. (3) Increase in life span has led to increasing in incidence, which is about 90% in 55-64 years aged postmenopausal women. Only registered cases are included, additionally, a lot of cases are unreported and underdiagnosed. (4)

According to the WHO, only malignancies of ovarian origin (primary) are considered, with the majority of tumours falling into the epithelial, mesenchymal, sex cord-stromal, and germ cell categories. The remaining (very uncommon) tumours fall under the miscellaneous group. (5) The majority of ovarian cancer patients (60%) are diagnosed with the distant-stage disease, for which the 5-year survival rate is only 29%, despite the fact that risk factors are obvious. The risk of mucinous ovarian cancer is increased by smoking cigarettes by roughly 80%. (6) A per cent increase in the risk of epithelial ovarian cancer is linked to physical inactivity. (7,8,9). There is some evidence, according to the International Agency for Research on Cancer, that using body powder with talc in it when in the genital area increases the risk of ovarian cancer. (10)

The primary goal of this research is to examine the prevalence trend and characteristics of ovarian cancer, and aid us in understanding and identifying risk or prognostic factors for early cancer detection. It can take a long time to identify ovarian cancer because it can go years without showing any symptoms. Consequently, the disease is discovered at a later stage, increasing the likelihood of high mortality. There is currently no reliable screening method for ovarian cancer, which makes it a major global problem. These qualities make this tumour a public health concern. Therefore, controlling this threat requires a thorough grasp of epidemiologic factors. The goal of the current study is to understand the prevalence, trend, and features of ovarian cancer.

Materials and methods

The present hospital-based epidemiological study was carried out at Basavataarakam Indo-American Cancer Hospital & Research Institute (BIACH&RI) in Hyderabad, Telangana, India.

Study type and sample size:

It is a retrospective hospital-based study. All the patients diagnosed with ovarian cancer, who

were registered in the hospital-based cancer registry of BIACH&RI during the study time period

from January 1, 2017, to December 31, 2021(5 years) were enrolled in the study. As per WHO standardized guidelines on patient information for a Hospital-based cancer registry, detailed information on sociodemographic profile, medical history, symptoms, treatment, family history, and addictions was obtained from the medical records.

Ethical consideration:

The ethical review committee of BIACH&RI approved this study – (ECR/7/Inst/AP/2013/RR-20).

Statistical analysis:

The data were analyzed with IBM SPSS version 26. The data was displayed using frequency, percentage, mean, standard deviation, and range (minimum and maximum values).

Results

During the study period, there were 94133 malignancies overall. Over the course of the five-year period, there were 5524 gynaecological cancers, including 1433 ovarian cancers.

The annual distribution of gynaecological malignancies by the site is displayed in Table 1. Cervical cancer was the most common gynaecological malignancy, occurring in 3118 cases (56.5%), followed by ovarian cancer in 1433 cases (26%) endometrial cancer in 636 cases (11.5%) vaginal cancer in 267 cases (4.8%) and vulva cancer in 70 cases (1.2 %). The second most common cancer among gynaecological malignancies, with 26% of cases, was ovarian cancer. Ovarian cancer incidences marginally increase during the research period, with the highest percentage (28.90%) occurring in 2020.

Table 1 Annual distribution of gynaecological malignancies by site

Cancer site	Cervix	Endometrium	Ovary	Vagina	Vulva	Total
2017	Cases 792	124	318	45	12	1291
	% 61.35%	9.60%	24.63%	3.49%	0.93%	23.37%
2018	Cases 703	140	294	61	23	1221
	% 57.58%	11.47%	24.08%	5.00%	1.88%	22.10%
2019	Cases 659	117	301	71	18	1166
	% 56.52%	10.03%	25.81%	6.09%	1.54%	21.11%
2020	Cases 455	104	254	59	7	879
	% 51.76%	11.83%	28.90%	6.71%	0.80%	15.91%
2021	Cases 509	151	266	31	10	967
	% 52.64%	15.62%	27.51%	3.21%	1.03%	17.51%
Total	Cases 3118	636	1433	267	70	5524
	% 56.44%	11.51%	25.94%	4.83%	1.27%	100%

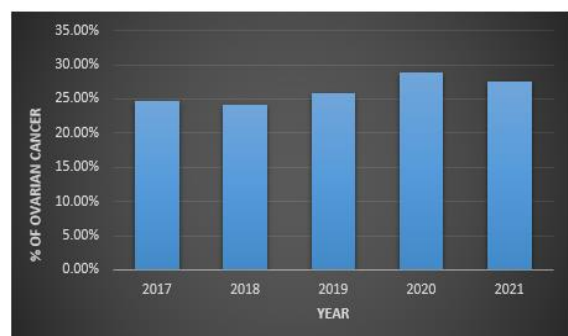


Figure 1. Ovarian cancer year-wise percentage

The graph above (Fig 1) shows a slight increase in the number of instances, from 24.63 to 27.51 per cent. Peak incidences are observed in 2020, which is 28.9%.

The distribution of ovarian cancer patients by age group is shown in Table 2. The age group 51–60 years had the highest percentage of cases, 452 (31.5%), followed by 41–50 years 349 (24.3%), 61–70 years 308 (21.5%), 31–40 years 143 (10%), 71–80 years 94 (6.5%), 21–30 years 59 (4.1%), 11–20 years 17 (1.2%), and 81–90 years 10 (0.7%). At one year of age, one sex cord tumour was discovered. More than half of the cases were post-menopausal in age. The patient's mean age at diagnosis of ovarian malignancy was 52.5 ± 3.14 years.

Table 2 Age-wise distribution of ovarian cancer in the study population

Age	Cases	%
0-10	1	0.07%
11-20	17	1.19%
21-30	59	4.12%
31-40	143	9.98%
41-50	349	24.35%
51-60	452	31.54%
61-70	308	21.49%
71-80	94	6.56%
81-90	10	0.70%
Total	1433	100.00%
Mean age	52.5 ± 3.14	

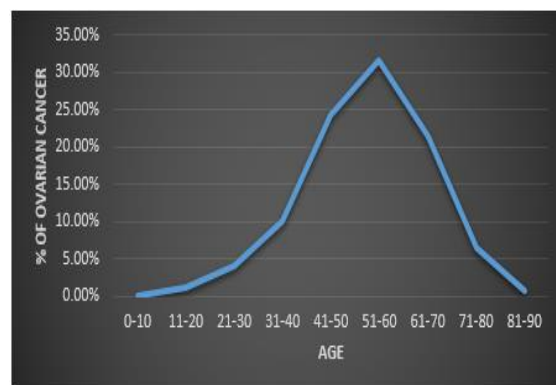


Figure 2. Shows the ovarian cancer percentage in different age groups

The graph reveals that between the ages of 41 and 70, at this age range 77% of ovarian cancers occurred

The age-based ovarian cancer presentation stage is shown in Table 3. 413 instances (28.8% of all cases) were labelled as unknown because they could not be staged. The majority of cases of ovarian cancer detected were in stage III, with 539 (35.6%) cases, stage IV (315) cases, stage I (79.5%), and stage II (36.3%) cases (2.5 %). 15 patients had borderline ovarian tumours which are considered premalignant stage.

The mean age of diagnosis for Stage I was 44.11 years, Stage II 47.5 years, Stage III 55 years, and Stage IV 53 years.

Table 3 Ovarian cancer age-related stage of diagnosis

Age	Stage				(Unknown)	Others	Boarder line	Total
	I	II	III	IV				
0-10						1		1
11-20	5	1		2	5	4		17
21-30	10	2	5	13	21	6	2	59
31-40	15	7	38	33	43	5	2	143
41-50	22	10	135	76	90	11	5	349
51-60	15	10	181	104	131	7	4	452
61-70	9	5	137	66	87	2	2	308
71-80	2	1	38	21	32			94
81-90	1		5		4			10
Total	79	36	539	315	413	36	15	1433
%	5.5	2.5	35.8	22	28.8	2.5	1	100
Mean age	44.11	47.5	55	53				

The frequency of ovarian cancer in various socioeconomic classes such as low-income group labor (LIGL), low-income group non-labor (LIGNL), and middle and high-income group (MAHIG) are shown in Table 4. Nearly 49% of instances are observed in MAHIG, followed by 42% in LIGL, and 9% in LIGNL.

Table 4 Prevalence of ovarian cancer in different socioeconomic groups

Socioeconomic Group	No. of Cases	%
LIGNL	133	9%
LIGL	600	42%
MAHIG	700	49%
TOTAL	1433	100.00%

Table 5 compares the parity of ovarian cancer cases to other gynaecological cancers. When compared to patients with other gynaecological cancers, ovarian cancer patients had the highest rate of nulliparous condition (18.2%) in the age range 12 to 79 years.

Table 5 Comparing the parity of ovarian cancer cases to those of other gynaecological malignancies

Cancer Site	Total	%
Cervix	3118	56.44%
Nulliparous	323	10.36%
Parous	2795	89.64%
Endometrium	636	11.51%
Nulliparous	96	15.09%
Parous	540	84.91%
Ovary	1433	25.94%
Nulliparous	261	18.21%
Parous	1172	81.79%
Vagina	267	4.83%
Nulliparous	32	11.99%
Parous	235	88.01%
Vulva	70	1.27%
Nulliparous	5	7.14%
Parous	65	92.86%
Grand Total	5524	100.00%

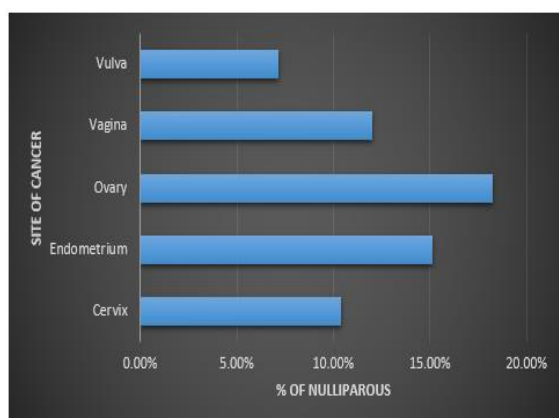


Fig 3. Displays the percentage of nulliparous condition in various gynaecological cancers.

The graph above demonstrates that the prevalence of nulliparity among ovarian cancer patients is comparatively high.

Abdominal symptoms, such as pain, discomfort, distension, or lumps, are observed in 941 (66%) patients. In 133 cases, anorexia is one of the symptoms. Other symptoms include back discomfort, constipation, weight loss, and vomiting. Approximately 123 (8.6%) ovarian cancer patients had diabetes mellitus, 220 (15.3%) have hypertension, and 56 (4%) have hypothyroidism.

In 350 (25%) of women have spread to the liver, bones, brain, lungs, and lymph nodes, and also to other parts of the genital tract. There have been 31 hospital deaths overall (2%), all of which were caused by the disease's progression. Seven members have subfertility concerns. Ovarian cancer can run in families, as evidenced by the fact that 56 of the cases (4%) had a family history.

Only 15 cases (1%) of addictions, such as smoking, chewing tobacco, drinking alcohol, gutka, and zarda, were observed; therefore, they are not statistically significant.

Discussion

In Indian women, ovarian cancer ranks third among gynaecological cancers. Cervical and breast cancer are the two most prevalent gynaecological cancers. Between 5.4 and 8/100000 people will have ovarian cancer. Age 35 marks the beginning of the risk increase, which peaks between the ages of 55 and 64. With a 5-year survival rate of about 45%. This is partly due to the fact that it is typically detected in stages III or IV. Due to the absence of distinct symptoms this cancer is not diagnosed at an early stage so fatality rates are high. Because of the lack of a known cause for ovarian cancer, there are no reliable screening methods like a pap smear for cervical cancer. (11)

Clinical research has sought to develop methods for ovarian cancer early diagnosis. In a recent consensus statement, the American Cancer Society, the Society of Gynaecology Oncologists, and the Gynaecologic Cancer Foundation identified four symptoms that are more typical in women with ovarian cancer: 1)

Bloating, 2) pelvic or abdominal pain, 3) difficulty eating or feeling full quickly, and 4) urinary symptoms (i.e., urgency or frequency). Taken together, these symptoms are called the Ovarian Cancer Symptom Index. (12)

Never having children, infertility, early menarche and late menopause, defective BRCA1 and BRCA2, families with a history of breast cancer, and post-menopausal hormone therapy are risk factors for ovarian cancer. (11)

In this investigation, 26% of the malignant tumours in the female genital tract were ovarian malignancies. These results precisely match that of the study by Sonia Puri et al., (2018) (13)

Ovarian cancer is the most prevalent malignancy in some nations. In a Pakistani tertiary care hospital, Wasim T et al., 2021, (14), discovered 49.18 percent ovarian cancer, while Manzoor H et al., 2017, (15), at the Centre for Nuclear Medicine and Radiotherapy (CENAR), in Pakistan's south-western region, discovered 47 percent ovarian cancer. At the nuclear institute of medicine and radiation Jamshoro Sindh, the ovary was the most common site, followed by the cervix, according to Bibi S et al., 2016, (16). The Teaching Hospital in Batticaloa, Sri Lanka, where around 143 genital tract tumours were discovered, had an equal number of cases of both cervical and ovarian cancer. Thirukumar M. and Sinnathurai A. 2021 (17) discovered 52 cervical tumours (36.36 percent) and 52 ovarian malignancies (36.36 percent).

During the study period, ovarian cancer incidences slightly rise, with the greatest percentage (28.29 percent) happening in 2020. The incidence rate of ovarian cancer has been growing in most registries, according to the review of Murthy et al., (2009) on changing trends in incidence of ovarian cancer - the Indian scenario. The mean annual percentage rise in ASR ranged from 0.7 percent to 2.4 percent. This upward trend may be caused by greater exposure to risk factors, greater awareness, or an increase in the number of older women. (18)

According to Doufekas K and Olaitan A, (2014), ovarian cancer death rates in the UK have decreased recently, although they are still higher than in other European or American nations. (19)

In the study by Sonia Puri et al., (2018) almost all the years a similar number of cases were found to be recorded. (17)

Ovarian cancer risk and age are strongly correlated. The age group 51–60 years had the highest percentage of cases in this study, with 452 (31.5%), followed by 41–50 years with 349 (24.3%), 61–70 years with 308 (21.5%), 31–40 years with 143 (10%), 71–80 years with 94 (6.5%), 21–30 years with 59 (4.1%), 11–20 years with 17 (1.2%), and 81–90 years with 10. (0.7 %). More than 60% of the instances were discovered after the patient turned 50. The patient's mean age at diagnosis of ovarian malignancy was 52.5 ± 3.14 years.

According to Doufekas K. and Olaitan A, (2014), 80% of cases are detected beyond age 50. (19)

The likelihood of malignant transformation rose with age. According to Murthy et al., (2009) the condition starts to become more prevalent around the age of 35 and peaks between the ages of 55 and 64. (18) In their study, the mean age at diagnosis reported varied between 52.2 to 59.5 years.

In their study, Saini et al., (2016) noted that the patients' mean age at diagnosis was 55.98 ± 9.24 (median = 55). (20)

According to Basu et al., (2009), the mean age was 48.8 ± 11.2 years. (21) The largest incidence of 44.3 percent was recorded in the age category of 41–50 years in a different study conducted in India by Mondal et al., (2018). The median age at diagnosis was reported as 48 years old. (22) The average age at diagnosis in the UK, according to Doufekas K. and Olaitan A. (2014), was 63 years old. (19) The mean age at diagnosis was 52.1 ± 8.96 years (median=52) in the study of Sonia Puri et al., 2018. (17)

Due to the delay between the start of symptoms and diagnosis, the disease is discovered at an advanced stage. Stage III of ovarian cancer was the most common presentation stage in the current study, accounting for 539 (35.6%), followed by stage IV 315 (22%) stage I 79 (5.5%), and stage II 36 (2.5 %). Additionally, it was discovered that the mean age rose in connection to the diagnosis stage. The mean age of diagnosis for Stage I was 44.11 years, Stage II was 47.5 years, Stage III was 55 years, and Stage IV was 53 years.

Sonia Puri et al., (2018), reported that 24% of patients were diagnosed in stage III and 20% were in stage IV, the mean age at diagnosis for Stage I was 44.51 years (median=47 years), for Stage II 52.36 years (median= 52.5 years), 51.09 years (median=51 years) for Stage III, and 48.72 years (median=50 years) for Stage IV. (17)

Similar findings were found in research by Saini et al., (2016) which had a mean age range of 52.67 ± 8.04 years for stage I to 58.30 ± 8.48 years for stage IV. They found that 16.56 percent of patients were in stage IV, 20.8% of cases were in stage II, and 47.85% of cases were in stage III. (20)

According to Doufekas K. and Olaitan A, (2014), 60 percent of cases had stage III or stage IV diagnoses. (19) In addition, Mondal et al., (2011) reported 20% of cases in stage II and 60% in stage III, the overall survival rate was 85% for stage I tumours, 65% for stage II, 30% for stage III and 15.5% for stage IV tumours. (22) While Basu et al., (2009) reported that 80% of patients in stage III/IV upon diagnosis. (21)

Nearly 49% of cases of ovarian cancer are found in MAHIG, followed by 42% in LIGL and 9% in LIGNL.

High Human Development Index (HDI) nations have higher rates of cancer prevalence, however, the pattern of mortality rates is shifting, according to Momenimovahed Z et al., (2019)'s research. Genetics is one of the most important causes of ovarian cancer, while there are other factors as well. Pregnancy, nursing, and oral contraception all reduce the risk of contracting this sickness. (23)

Ovarian cancer patients exhibited the highest rate of nulliparity compared to those with other gynaecological malignancies (18.2 %).

Increased parity and prolonged use of oral contraceptives (OC) are linked to a lower risk of invasive epithelial ovarian cancer (EOC), cancer with a 44 percent five-year survival rate in the US, according to research by McGuire V et al. (2016). (24)

The risk of ovarian cancer was found to decrease with unilateral ovariectomy, longer use of oral contraceptives, and more full-term pregnancies. (25)

A woman without a family history of ovarian cancer has a 1 in 55 lifetime chance of

developing the disease, according to the National Cancer Institute (NCI). When recognized familial or inherited problems exist, this risk multiplies by ten. (26)

The "incessant ovulation" hypothesis, according to Tung et al. (2005), holds that the frequency of ovulatory cycles increases the rate of cellular division linked to the repair of the surface epithelium after each ovulation, increasing spontaneous mutations. This notion is supported by the association between higher risk and an increase in lifetime ovulations. (27)

941 (66%) of the patients report experiencing abdominal symptoms like pain, discomfort, distension, or lumps.

With a multivariate analysis by James Dilley et al. (2020), mortality was significantly elevated in the presence of advanced stage, growing residual disease, and insufficient primary treatment, as well as abdominal pain and loss of appetite/feeling full. (28)

56 (4%) of the ovarian cancer patients had hypothyroidism, 220 (15.3%) had hypertension, and 123 (8.6%) had diabetes mellitus. 350 (25%) of the cases have spread to the liver, bones, brain, lungs, and lymph nodes, and cancer in those people has also affected other parts of the genital tract.

The conventional treatment for ovarian cancer involves surgical staging with the best possible cytoreduction, followed by platinum-based chemotherapy according to the tumour's stage.

Around 63 percent of the patients in the current study received total abdominal hysterectomy along with bilateral salpingo-oophorectomy or cytoreduction. Neoadjuvant chemotherapy (NACT) was given to 31% of the patients.

Sonia Puri et al., (2018), reported that 1.3% of patients were treated with surgery i.e. Total Abdominal Hysterectomy (TAH) with Bilateral Salpingo Oophorectomy (BSO) with infracolic omentectomy, followed by chemotherapy. 20% of patients were given Neoadjuvant chemotherapy (NACT), surgery, and postoperative chemotherapy. 51% of cases received palliative chemotherapy. (17)

Even in the specialized cancer institute, the management of ovarian cancer falls short of expectations. One of the primary factors that negatively impact survival from advanced

ovarian cancer is poor patient compliance with chemotherapy. Due to advancements in chemotherapy and surgery, survival rates for people with early-stage cancer have increased, although the majority of patients still report having late-stage disease.

Conclusions and Recommendations

Ovarian cancer has emerged as one of the commonest malignancies affecting women in India. A steady increase has been observed in the incidence of ovarian cancer in several registries. Its diagnosis is done in an advanced stage with poor survival. Efforts should be made to detect the disease at an early stage through population education with respect to epidemiological factors.

“A woman’s strongest defence against this disease is merely to ‘listen’ to her body and be attuned to changes”. (29)

Women should be made aware of the early warning signs of ovarian cancer, such as stomach pain or discomfort, bloating, early fullness, frequent urination, and postmenopausal vaginal bleeding, urging them to go to the hospital if any of the aforementioned symptoms appear

Currently, a major goal of ovarian cancer research is to develop an effective test that can detect the disease at its earliest stages, which would ultimately result in decreased mortality. Increased knowledge of ovarian cancer aetiology and pathogenesis would greatly enhance the development of this tool.

Another strategy for improving the diagnosis of ovarian cancer is to inform primary care physicians about the disease and to include it in the differential diagnosis for the particular patient population. To identify the causes that are causing the disease to occur more frequently and their mechanisms of action, additional research is required. An epidemiological study should be conducted in low resource settings, such as India, to determine the impact of screening programmes utilising a relatively simple imaging modality (USG) on diagnosis in patients in the ovarian cancer risk age group who have hazy stomach symptoms. It is important to do research to develop screening and early diagnosis tools so that more effective

therapeutic strategies can be developed to lessen the load.

The risk of ovarian cancer is reduced by 20% with breastfeeding and by 25% through parity. The two areas should therefore be taught to women.

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