Clinico-pathological study of ovarian tumors in Goa medical college: a tertiary care centre in Goa, India

Manjusha Jindal*, Dweep Jindal, Mrinalini Sahasarabhojane, Viraj Naik

Department of Obstetrics and Gynecology, Goa Medical College, Bambolim, Goa, India

Received: 13 August 2019
Accepted: 07 September 2019

*Correspondence:
Dr. Manjusha Jindal,
E-mail: manjushajindal@gmail.com

ABSTRACT

Background: Ovarian neoplasms are a distinct entity in women health care and are increasingly contributing to morbidity and mortality among women. The burden is not only related to the increasing incidence but also to the varied pathological features depending on the tissue of origin and pathogenesis. The study was carried out to find the prevalence and determine the clinical presentation and histopathological distribution of ovarian neoplasms. Management options were also noted.

Methods: It is a retrospective study carried out at Goa Medical College between January 2013 to December 2015. All patients diagnosed and treated for ovarian neoplasm were included in the study. Data was tabulated using Microsoft Excel and descriptive statistical analysis was carried out using SPSS version 23.

Results: A total of 3111 patients were admitted in gynecology at Goa Medical College during the specified time period. Of these 358 cases were diagnosed with ovarian neoplasm. On histopathology 196 were benign tumors and 162 were reported to be malignant. Commonest presenting symptom was abdominal distention seen in 51.1% of the patients, pain in 44.4%, followed by dyspepsia in 26.85%. Epithelial tumors were most common (Benign - 39.3%, Malignant - 41%) followed by sex cord stromal tumors and germ cell tumors in 7.26% of cases.

Conclusions: Surface epithelial tumors were most common neoplasm. An alarming high no. of malignant tumors (45.25%) was found in present study. 44.4% tumors presented in 41-50 years age group. Presenting complaints were vague and nonspecific leading to delay in diagnosis. Histological type correlates with prognosis; therefore, preponderance of histological type will guide treatment options and patient education with respect to epidemiology.

Keywords: Benign, Germ cell, Histopathological type, Malignant, Ovarian neoplasm, Surface epithelial

INTRODUCTION

Ovary, the Female gonad is very complex in its embryology and histology. Due to complex histology, the ovarian tumors have different cell origins, complex nature and varied clinical presentation.1 They present at any age but 90% of benign tumors are seen in childbearing age.2 Benign tumors are cystic in nature and presence of solid components increases suspicion of malignancy. The potential malignant behaviour of some ovarian tumors causes dilemma with respect to conservative/definitive surgery.

Malignant ovarian tumors comprise of 3.6% of all cancers in women. It is the seventh most common cancer among women (age standardised incidence rate being 6.1/100,000) and fifth leading cause of cancer deaths (4.3%) globally with age standardised mortality rate being 3.8/100,00.3 In developed countries, more than 90% of malignant ovarian tumors are epithelial in origin,
5%-6% of tumors constitute sex cord-stromal tumors, and 2%-3% are germ cell tumors. The common epithelial ovarian cancers (EOCs) include high-grade serous (70%), endometrioid (10%), clear cell (10%), mucinous (3%), and low-grade serous carcinomas (<5%).

Ovarian tumors are not detected early as they occupy available space in pelvis and abdomen for expansion. They seek attention after achieving big size. In malignant tumors, the symptoms are vague, and therefore patients unfortunately present in late stages.

The clinical presentation and imaging findings provide diagnostic clue in some cases. The laterality of the tumor also indicates their nature, as sex cord stromal tumors are usually unilateral. The role of pathologist is important in establishing correct diagnosis and effective treatment.

Study of clinical presentation, histopathological pattern, management options and response not only help for prognostication, but also redefines management. With government focus on maternal and child health services, these women are usually neglected. Health seeking behaviour is also guided by social and economic factors.

Present study is undertaken to find out the prevalence, age distribution and histological pattern prevalent in our population so as to guide treatment options and provide patient education.

METHODS

This is retrospective descriptive study carried out in the Department of Obstetrics and Gynecology, Goa Medical College, A tertiary care center of state of Goa from January 2013 to December 2015. Study subjects consisted of admitted patients in gynecology ward; diagnosed as case of ovarian tumor on basis of clinical and imaging findings and confirmed by laparotomy/ laparoscopy findings and histopathology. Pelvic masses other than ovarian tumor on histopathology were excluded from the study. The clinical data specially included was physical symptoms, examination findings. Study data included age at diagnosis, obstetric history, menstrual history, personal and family history, and presenting complaints. Imaging studies included USG in all cases and CECT/MRI wherever indicated. Laparotomy/laparoscopy findings and treatment was noted. Histopathology details were noted down and classification was done according to International Classification of diseases (WHO classification 2019). Data was tabulated using microsoft excel and expressed in terms of percentage and means with standard deviation.

Approval of Institutional Ethics committee of Goa Medical College was taken.

Objectives of this study were to study the proportion of ovarian tumors. To study the distribution of ovarian neoplasms as per WHO classification. To study their age distribution. To study the clinical presentation and correlation to histopathology.

RESULTS

There were 358 cases of ovarian tumors among 3311 Gynecological admissions during three years period from January 2013 to December 2015. Thus, the proportion of ovarian tumors among all gynecological admissions was 10.8%. Among these, 196 (54.75%) were benign tumors and 162 (45.25%) cases were malignant tumors including four cases of borderline malignancy.

Histo-pathology

The surface epithelial tumors were most common (80.45%) as per WHO classification as shown in Table 1.

| Histology   | Benign | Malignant | Total | Total %age |
|-------------|--------|-----------|-------|------------|
| Surface epithelial | 141 (39.4%) | 147 (41%) | 288   | 80.45%     |
| Sex cord stromal   | 34 (9.5%)   | 6 (1.67%) | 40    | 11.17%     |
| Germ cell          | 21 (5.86%)  | 5 (1.4%)  | 26    | 7.26%      |
| Secondary          | -        | 2 (0.56%) | 2     | 0.56%      |
| Undifferentiated   | 2        | 2         | 2     | 0.56%      |
| Total              | 196      | 162       | 358   | 100%       |

Table 2 shows the histopathological pattern of benign ovarian tumors. In benign tumors serous epithelial tumors were most common followed by mucinous tumors.
Table 2: Distribution of benign ovarian tumours as per histo-pathology.

| Histology                        | N=196 | %  |
|----------------------------------|-------|----|
| Serous tumor                     | 95    | 48.47|
| Mucinous tumor                   | 38    | 19.38|
| Endometroid tumor                | 3     | 01.53|
| Brenner tumor (transitional cell)| 3     | 01.53|
| Mixed                            | 2     | 01.02|
| Steroid cell                     | 2     | 01.02|
| Adeno-fibroma                    | 18    | 9.19 |
| Fibroma thecoma                  | 14    | 7.14 |
| Mature cystic teratoma           | 21    | 10.72|

Table 3: Distribution of malignant ovarian tumours including borderline malignancy as per histo-pathology.

| Histology                        | N=162 | %  |
|----------------------------------|-------|----|
| Epithelial tumors                |       |    |
| Serous tumor                     | 121   | 74.69|
| Mucinous tumor                   | 11    | 06.79|
| Endometroid tumor                | 3     | 01.85|
| Clear cell                       | 12    | 07.40|
| Sex cord stromal tumor           |       |    |
| Mixed                            | 1     | 0.6 |
| Granulosa cell                   | 5     | 3.1 |
| Germ cell tumors                 |       |    |
| Dyserminoma                      | 3     | 1.85|
| Immature teratoma                | 2     | 1.24|
| Secondaries                      |       |    |
| Kruckenberg                      | 2     | 1.24|
| Undifferentiated                 | 2     | 1.24|

Table 4: Mean age of cases with ovarian tumors.

| Histology                        | Benign | Borderline | Malignant |
|----------------------------------|--------|------------|-----------|
| Surface epithelial               | 42.06±5.8 | 45.46±1.2 | 52.97±6.27|
| Serous                           | 38.84±8.7 | 43.7 | 53.8±7.4|
| Mucinous                         | 41.31±6.4 | 46.3±0.8 | 56.4±5.6|
| Endometroid tumor                | 43.8±2.3 | 46.4 | 57.1±3.2|
| Clear cell                       |        |            |           |
| Brenner tumor (transitional cell)| 39.75±1.3 | |           |
| Mixed                            | 46.6±0.8 | |           |
| Sex cord stromal Tumor           | 39.59±9.9 | 43±2.4 |           |
| Steroid cell                     | 24.8±1.9 | |           |
| Adeno-fibroma                    | 42.8±2.7 | |           |
| Fibroma thecoma                  | 46.66±3.4 | |           |
| Granulosa cell                   | 43.1±2.6 | |           |
| Mixed Mullerian tumor            |        | 43.6 |           |
| Sex cord stromal tumor           |        | |           |
| Germ cell tumor                  | 37.3±5.3 | 23.5±8.3 |           |
| Mature cystic teratoma           | 37.3±5.3 | |           |
| Dyserminoma                      | 26.1±9.2 | |           |
| Immature teratoma                | 20.9±1.3 | |           |
| Secondary (Krucken berg)         | 46.7±2.8 | |           |
| Undifferentiated                 | 43.4±3.4 | |           |

Age

Surface epithelial benign tumors were seen at mean age of 42.06±5.8 years while malignant tumors were found at mean age of 52.97±6.27 years. Malignant germ cell tumors were seen at mean age of 23.5±8.3 years and benign tumors at mean age of 37.3±5.3 years. Table 4 shows mean age of cases with various ovarian tumors.

Table 5: Age wise distribution of ovarian tumors.

| Age in years | Total no. of tumors | No. of Benign/ borderline/malignant | Histopathology               | No. of Benign/ borderline/malignant | %  |
|--------------|---------------------|------------------------------------|-------------------------------|-------------------------------------|----|
| <20          | 4 (1.1%)            | 2/0/2                              | Surface epithelial            | 2/0/0                               | 2  |
|              |                     |                                    | Sex cord stromal              | 0                                   | 0  |
|              |                     |                                    | Germ cell                     | 0/0/2                               | 2  |
|              |                     |                                    | Secondary                     | 0                                   | 0  |
|              |                     |                                    | Undifferentiated              | 0                                   | 0  |
| 21-30        | 28 (7.8%)           | 25/0/3                             | Surface epithelial            | 13/0/0                              | 13 |
|              |                     |                                    | Sex cord stromal              | 4/0/0                               | 4  |
|              |                     |                                    | Germ cell                     | 8/0/3                               | 11 (42.3%) |
|              |                     |                                    | Secondary                     | 0                                   | 0  |
|              |                     |                                    | Undifferentiated              | 0                                   | 0  |
| 31-40        | 89 (24.8%)          | 76/2/11                            | Surface epithelial            | 53/2/8                              | 63 (21.8%) |
|              |                     |                                    | Sex cord stromal              | 12/0/2                              | 14 (35%) |
|              |                     |                                    | Germ cell                     | 12/0/0                              | 12 (46%) |
|              |                     |                                    | Secondary                     | 0                                   | 0  |
|              |                     |                                    | Undifferentiated              | 0/0/1                               |    |
Benign epithelial and sex cord stromal tumors were most common in 41-50 years while malignant epithelial tumors were seen in age group of 41-60 years. Germ cell tumors occurred in younger patients (21-40 years). The youngest patient was 16 years old, a case of endodermal sinus tumor while the 73 years old lady had serous cyst adenocarcinoma. Age wise distribution is shown in Table 5. Surface epithelial tumors were most common in all age groups. Benign surface epithelial tumors were more than malignant tumors till 40 years of age and after 40 years malignant tumors took preponderance. Most of the sex cord stromal tumors were seen in 31-50 years of age. Malignant germ cell tumors were seen before 30 years of age while mature cystic teratoma was seen between 21-40 years and only one case was at 43 years of age.

**Obstetric history**

The cases had no specific relation to parity as shown in Table 6.

### Table 6: Para wise distribution of ovarian tumors.

| Parity | Benign | Borderline | Malignant | Total |
|--------|--------|------------|-----------|-------|
| 0      | 56 (28.6%) | 17 (10.6%) | 73 (20.4%) |       |
| 1      | 33 (16.8%) | 31 (19.29%) | 64 (17.9%) |       |
| 2      | 51 (26.1%) | 1 (25%) | 44 (28.17%) | 96 (26.8%) |
| 3      | 38 (19.4%) | 2 (50%) | 33 (21.05%) | 73 (20.4%) |
| 4      | 16 (8.1%) | 1 (25%) | 18 (11.48%) | 35 (9.7%) |
| >4     | 2 (1%) | 15 (9.57%) | 17 (4.8%) |       |
| **Total** | **196 (100%)** | **4 (100%)** | **158 (100%)** | **358 (100%)** |

### Table 7: Clinical presentation.

| Symptom                  | Benign      | Malignant | Total N=358* |
|--------------------------|-------------|-----------|--------------|
| Asymptomatic             | 5 (1.4%)    | 0         | 5 (1.4%)     |
| Infertility              | 27 (7.54%)  | 0         | 27 (7.54%)   |
| Pain abdomen             | 102 (28.5%) includes 3 cases of acute abdomen | 57 (15.9%) | 159 (44.4%) |
| Abdominal distension     | 92 (25.7%)  | 91 (25.4%) | 183 (51.1%)  |
| Amenorrhea               | 3 (0.83%)   | 0         | 3 (0.83%)    |
| Abnormal uterine bleeding| 16 (4.47%)  | 18 (5.02%) | 34 (9.5%)    |
| Dyspepsia                | 0           | 96 (26.8%) | 96 (26.8%)   |
| Loss of weight           | 2 (0.56%)   | 61 (17.0%) | 63 (17.6%)   |
| Urinary symptoms         | 3 (0.84%)   | 6 (1.68%)  | 9 (2.51%)    |
| Breathlessness           | 6 (1.58%)   | 20 (5.59%) | 26 (7.26%)   |

* Few patients had multiple symptoms therefore the total no. exceeds actual cases.
Menstrual function

90 (97%) women were regularly menstruating among benign ovarian tumors as compared to 99 (61.1%) women having malignant tumor. Six (3.06%) women were post-menopausal among benign tumors compared to 63 (38.9%) women with malignant tumor.

Clinical presentation

The clinical presentation is as shown in Table 7. The predominant symptom in benign tumors was pain abdomen (28.5%) followed by abdominal distension in 25.7% cases. Among malignant tumors dyspepsia was the predominant symptom in 26.8% followed by abdominal distension in 25.4% of all tumors. Among benign tumors serous cyst adenoma was commonest comprising of 48.47% followed by mucinous cyst adenoma (19.38%) and mature cystic teratoma (10.72%).

Laterality

Benign tumors were unilateral in 134 (68.36%) cases while malignant tumors were bilateral in 94.9% cases and unilateral only in 5.1% cases (Table 8).

Table 8: Laterality of ovarian tumors.

| Laterality | Benign | Borderline | Malignant |
|------------|--------|------------|-----------|
| Unilateral | 134 (68.4%) | 1 | 8 (5.1%) |
| Bilateral  | 62 (31.6%) | 3 | 150 (94.9%) |
| Total      | 196     | 4 | 158      |

Table 9: Treatment options in benign tumors.

| Type of Surgery | No. | % |
|-----------------|-----|---|
| Cystectomy      | 97  | 49.5|
| Ovariotomy      | 28  | 14.3|
| Salpingo-ovarioty | 12  | 6.2 |
| Hysterectomy with ovariectomy | 59  | 30  |
| Total           | 196 | 100 |

Table 10: Treatment options in malignant tumors.

| Type of treatment | No. | % |
|-------------------|-----|---|
| Ovariotomy        | 4   | 2.5|
| TAH with BSO with / without omentectomy | 10  | 6.2 |
| Surgery + Chemotherapy | 43  | 26.5|
| NACT+surgery +chemo | 61  | 37.7|
| NACT Awaiting surgery | 26  | 16.0|
| Palliative Chemotherapy | 18  | 11.1|
| Total             | 162 |    |

Management

The treatment options were noted in both benign and malignant ovarian tumors. The treatment was conservative in most of benign tumors as shown in Table 9.

As malignant tumors are diagnosed late, 87 cases (53.7%) cases received neo-adjuvant chemotherapy (NACT). Table 10 shows the treatment options in malignant ovarian tumors.

DISCUSSION

The proportion of ovarian tumors among gynaecological admissions in our study was 10.85 % while Yogambal et al, reported 5.4% (402/7492) cases to be of ovarian tumors among hospital admissions. The benign tumors comprised of 54.75%, border line tumors were 1.12% and malignant tumors were 44.13%. All the studies (Table 11) reported a high proportion of benign tumors ranging from 64-90% while in our study benign tumors were 54.75%. We had a large number of malignant tumors as ours is the only tertiary hospital catering to whole of population of Goa and neighboring areas from states of Maharashtra and Karnataka.

Table 11: Incidence of benign and malignant tumors in various studies.

| Study                | Benign  | Borderline | Malignant |
|----------------------|---------|------------|-----------|
| Yogambal et al²      | 78.6%   | 0.75%      | 20.65%    |
| Manoja et al¹        | 90%     | -          | 10%       |
| Shanthi V³           | 91.67%  | -          | 8.33%     |
| Ameena⁴              | 64.57%  | -          | 35.43%    |
| Amod S⁵              | 75.7%   | 6.1%       | 18.2%     |
| Swamy G⁶             | 71.6%   | 3%         | 25.4%     |
| Sarangan A⁷          | 89%     | 4%         | 7%        |
| Sumaira Y¹²          | 89.71%  | -          | 10.29%    |
| Present study        | 54.75%  | 1.12%      | 44.13%    |

The clinical presentation of the tumors was variable. Abdominal distension/mass was the commonest symptom (51.1%) among all tumor followed by pain in 44.4% cases. Manoja et al, also reported mass per abdomen to be the commonest symptom in 40.8% followed by pain abdomen in 37.5% cases. In their study menstrual abnormality was seen in 10%, GI disturbance in 6.7% and infertility in 2.5% cases. In the study by Sumaira et al and Yogambal et al, pain abdomen was the commonest symptom in 70.59% and 66.92% respectively followed by mass abdomen in 14.71% and 28.11% respectively as shown in Table 12.

Table 12: Clinical presentation of ovarian tumors in various studies.

| Study                | Mass abdomen | Pain abdomen |
|----------------------|--------------|--------------|
| Manoja et al¹        | 40.8%        | 37.5%        |
| Sumaira et al¹²      | 14.71%       | 70.59%       |
| Yogambal et al²      | 28.11%       | 66.92%       |
| Present study        | 51.1%        | 44.4%        |
Pain in abdomen was the most common symptom in benign tumors 52% in present study while Manoja et al and Shanthi V, reported mass abdomen to be the commonest symptom in benign tumors as shown in Table 13.1,7

Among malignant ovarian tumors, dyspepsia 59.2% was the most common symptom followed by mass abdomen 56.2% and pain 35.2%. There were multiple symptoms present in many patients, Manoja et al and Shanthi V et al reported pain and mass in abdomen to be the commonest presenting symptom in their study in malignant tumors of ovary as shown in Table 14.1,7

**Laterality**

In present study benign tumors were unilateral in 68.36% cases while malignant tumors were unilateral in only 51% cases similar to the findings reported by Swamy G et al, where benign tumors were unilateral in 71% but 50% of malignant tumors also were unilateral.10 These findings were different from the findings of Manoja V et al, who reported unilateral benign tumors in 92.6% and 75% of malignant tumors also were unilateral as shown in Table 15.1

| Study                 | Benign | Malignant |
|-----------------------|--------|-----------|
|                       | Unilateral | Bilateral | Unilateral | Bilateral |
| Swamy et al10         | 71%     | 29%       | 50%        | 50%       |
| Manoja et al1         | 92.6%   | 7.4%      | 75%        | 25%       |
| Present study         | 68.36%  | 31.64%    | 5.1%       | 94.9%     |

**Table 13: Clinical presentation in benign tumors in various studies.**

| Study                  | Asymptomatic | Infertility | Menstrual abnormality | Pain | Mass abdomen | Loss of weight | GI symptoms | Misc. |
|------------------------|--------------|-------------|-----------------------|------|--------------|----------------|-------------|-------|
| Manoja et al1          | -            | 1.8%        | 9.3%                  | 38.9%| 42.6%        | -              | 7.4%        | -     |
| Shanthi V et al7       | -            | -           | 13.99%                | 36.36%| 39.16%       | -              | 10.49%      | -     |
| Present study (N=196)  | 2.55%        | 13.8%       | 9.7%                  | 52%  | 46.9%        | 1.0%           | -           | 4.6%  |

**Table 14: Clinical presentation in malignant tumors in various studies.**

| Study                  | Pain       | Mass abdomen | Menstrual abnormality | Dyspepsia | Ascites | Loss of weight | Misc. |
|------------------------|------------|--------------|-----------------------|-----------|---------|----------------|-------|
| Manoja et al1          | 25%        | 25%          | 16.7%                 | -         | 8.3%    | 16.7%          | 8.3%  |
| Shanthi V et al7       | 30.77%     | 23.08%       | 23.08%                | -         | 7.69%   | 15.38%         | -     |
| Present study (N=162)  | 35.2%      | 56.2%        | 11.1%                 | 59.2%     | 16%     | 37.6%          | 16.0% |

**Table 15: Laterality of ovarian tumors.**

| Study                  | Surface epithelial | Sex cord stromal | Germ cell | Metastatic | Undifferentiated/others |
|------------------------|-------------------|-----------------|-----------|------------|------------------------|
| Yogambal et al2        | 71.64%            | -               | -         | 0.75%      | -                      |
| Manoja et al1          | 84.2%             | 4.2%            | 10%       | 0.8%       | 0.8%                   |
| Shanthi V et al7       | 84.62%            | 3.85%           | 10.9%     | 0.64%      | -                      |
| Ameena et al8          | 52.76%            | 3.15%           | 43.31%    | 0.78%      | -                      |
| Amod S et al9          | 84.8%             | 6.1%            | 9.1%      | -          | -                      |
| Swamy G et al10        | 61.6%             | 11.7%           | 21.7%     | 5%         | -                      |
| Sumaira Y et al12      | 76.5%             | 4%              | 15%       | 0%         | 0%                     |
| Sarangan A et al11     | 81%               | 4%              | 15%       | 0%         | 0%                     |
| Present study          | 80.45%            | 11.17%          | 7.26%     | 0.56%      | 0.56%                  |
further management is guided by histopathological pattern.\textsuperscript{1, 2} Grading of tumor is also important in further management.\textsuperscript{12}

Among histopathological types the commonest tumor encountered in our study was epithelial tumor (80.45\%) followed by sex cord stromal tumors (11.17\%) and germ cell tumors (7.76\%). All the studies have shown preponderance of surface epithelial tumors ranging from 61.6 to 82.8\% followed by germ cell tumors. In our study sex cord stromal tumors were more than germ cell tumors. In study by Ameena et al. germ cell tumors were comparatively more constituting 43.3\%.\textsuperscript{8} The authors contributed it to geographical variation. (Lahore) Table 16 shows the histopathological pattern of tumors in various studies.

### Table 17: Proportion of tumors according to WHO classification.

| Histology                        | Manoja V | Shanthi V | Ameena  | Amod S | Swamy G | Sumaira Y | Present study |
|----------------------------------|----------|-----------|---------|--------|---------|-----------|---------------|
| Surface epithelial               | 80 ± 4.2 \% | 26 ± 28.76 \% | 47.4 ± 14 \% | - | 39.4 ± 41 \% |
| Serous                           | 62.5 ± 3.2 \% | 64.75 ± 1.92 \% | 55.7 ± 11 \% | 40.8 ± 6.6 \% | 24.5 \% | 48.47 \% |
| Mucinous                         | 17.5 ± 1 \% | 16.67 ± 1.3 \% | 10.3 ± 4.7 \% | 6.6 ± 4.9 \% | - | 19.38 \% |
| Endometroid tumor                | - | - | 6 ± 5.1 \% | 6.1 \% | - | 28.5 \% | 01.53 \% |
| Clear cell                       | - | - | 15.7 \% | - | - | - |
| Brenner tumor (transitional cell) | - | - | 0 ± 1.57 \% | - | - | 01.53 \% |
| Mixed                            | - | - | - | - | - | - |
| Sex cord stromal tumor           | 0.8 ± 3.4 \% | 1.28 ± 2.56 \% | 0.8 ± 2.35 \% | 6.1 \% | - | 9.5 ± 1.6 \% |
| Steroid cell                     | - | - | 0.8 \% | - | - | - |
| Sertoli leydig cell              | 0.8 \% | 0.64 \% | - | - | - | - |
| Adeno-fibroma                    | - | - | - | - | - | - |
| Fibroma thecoma                  | 0.8 \% | 1.28 \% | - | 6.1 \% | - | - |
| Granulosa cell                   | 1.7 \% | 1.28 \% | 2.27 \% | - | - | 28.5 \% |
| Mixed mullerian tumor            | 0.8 | 0.64 | - | - | - | - |
| Germ cell tumor                  | 9.2 ± 0.8 \% | 8.97 ± 1.92 \% | 37.8 ± 5.5 \% | 9.1 \% | - | 5.86 ± 1.4 \% |
| Mature cystic teratoma           | 9.2 \% | 8.97 \% | 37.8 \% | 9.1 \% | - | 18 \% |
| Dysgerminoma                     | - | 1.28 \% | 1.59 \% | - | - | - |
| Immature teratoma                | 0.8 \% | 0.64 \% | 1.59 \% | - | - | - |
| Yolk sac tumor                   | - | - | 2.27 \% | - | - | - |
| Secondary (Krucken berg)         | 0.8 \% | 0.64 \% | 0.8 \% | - | - | 0.56 \% |
| Undifferentiated                 | 0.8 \% | - | - | - | - | 0.56 \% |

### Table 18: Comparison of distribution of ovarian tumors in different age groups in various studies.

| Age          | Manoja V\textsuperscript{1} | Shanthi V\textsuperscript{2} | Ameena  | Sarangan A\textsuperscript{11} | Present study |
|--------------|-----------------------------|-----------------------------|---------|---------------------------------|---------------|
| <20 years    | 11.7\%                      | 10.26\%                     | 12.21\% | 2\%                             | 1.1\%         |
| 21-30 years  | 25\%                        | 25.64\%                     | 30.19\% | 24\%                            | 7.8\%         |
| 31-40 years  | 29.2\%                      | 28.85\%                     | 22.64\% | 29\%                            | 24.8\%        |
| 41-50 years  | 18.3\%                      | 18.59\%                     | 18.40\% | 27\%                            | 44.4\%        |
| 51-60 years  | 9.2\%                       | 9.62\%                      | 10.38\% | 13\%                            | 20.8\%        |
| >60 years    | 6.6\%                       | 7.0\%                       | 5.18\%  | 5\%                             | 1.1\%         |

When the tumors were categorised according to WHO subtypes, serous epithelial tumors were more common in both benign and malignant category followed by mucinous tumors as shown in Table 17.

### Age

The mean age in benign epithelial tumors in present study was 42.06 ± 5.8 years while malignant tumors presented at mean age of 52.97 ± 6.27 years. Deeba et al reported mean
age as 40.6±12.5 years in ovarian cancer cases while in study by Ameena A et al mean age at presentation of ovarian tumors was 35.6 years. Shanathi V, reported preponderance of benign tumors in 21-50 years similar to present study and malignant tumors were more common after 40 years. The age comparison of ovarian tumors in various studies is as shown in Table 18. All studies show similar pattern of occurrence of ovarian tumors that is preponderance in 21-50 years of age.

CONCLUSION

It is concluded from this study that the tumors originating from surface epithelium are the commonest variant. Germ cell tumours and sex cord stromal tumors were next to epithelial ovarian tumours. Majority of them were benign. Amongst malignant ovarian tumours late reporting is common and patients usually present in advanced stages of the disease. Commonest clinical presentation was mass abdomen and pain abdomen. Though the imaging technique and clinical examination help in detecting ovarian tumors, histopathological examination is the gold standard to determine the type of the ovarian tumor and its histogenesis which affects the treatment and prognosis of the tumor.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee of Goa Medical College, Goa, India

REFERENCES

1. Manoja V, Pramood M, Jyothi V, Chandrashekar KPA. Clinicopathological study of ovarian tumors: a 2-year study. Int J Sci Stud. 2017;5(3):300-5.
2. Yogambal M, Arunalatha P, Chandramouleeswari K, Palaniappan V. Ovarian tumours- incidence and distribution in a tertiary referral center in south India. IOSR J Dent Med Sci. 2014;13(2):74-80.
3. Ferlay J, Soerjomataram I, Ervik M, Dikshit R, Eser S, Mathers C, et al. GLOBOCAN 2012 v1.0, Cancer Incidence and Mortality Worldwide: IARC CancerBase No. 11. Lyon, France: International Agency for Research on Cancer (IARC); 2013.
4. Reid BM, Permuth JB, Sellers TA. Epidemiology of ovarian cancer: a review. Cancer Biol Med. 2017;14(1):9-32.
5. Sharma M, Soni A, Kaul R. Histopathological pattern of ovarian neoplasms in Sub-Himalayan belt of rural India: a four-year study from a tertiary care teaching hospital. Int J Reprod Contracept Obstet Gynecol. 2017;6:5448-52.
6. Deeba F, Alam ABMM, Banu J. Clinicopathological study of ovarian cancer: a multi centered study. J Shaheed Suhrawardy Med Coll. 2013;5(1):3-6.
7. Shanthi V. Clinicopathological study of ovarian tumors- a retrospective and prospective 5 years study. JMSCR. 2015;4(6):10880-5.
8. Ashraf A, Shaikh AS, Ishfaq A. The relative frequency and histopathological pattern of ovarian masses. Biomedica. 2012;28:98-102.
9. Sawant A, Mahajan S. Histopathological study of ovarian lesions at a tertiary health care institute. MVP J Med Sci. 2017;4(1):26-9.
10. Swamy GG, Satyanarayana N. Clinicopathological analysis of ovarian tumors: a study on five years Samples. Nepal Med Coll J. 2010;12(4):221-3.
11. Sarangan. “Clinicopathological and histological features of ovarian tumour- a study.” IOSR J Dent Med Sci. 2017;16(9):56-60.
12. Yasmin S, Yasmin A, Asif M. Clinicohistological pattern of ovarian tumours in Peshawar region. J Ayub Med Coll Abbottabad. 2008;20(4);11-3.

Cite this article as: Jindal M, Jindal D, Sahasrabhojane M, Naik V. Clinicopathological study of ovarian tumors in Goa medical college: a tertiary care centre in Goa, India. Int J Reprod Contracept Obstet Gynecol 2019;8:4071-8.