

## Distribution of various histopathological patterns of ovarian lesions in different age groups

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### ABSTRACT

The spectrum of ovarian pathologies embraces wide age range among females because the risk of developing ovarian lesion starts from birth and follows diverse patterns through-out the life.<sup>1,2</sup> The rate of development of complications, recurrence, progression to malignancy, morbidity and mortality, also varies according to the age of presentation of various ovarian pathologies.<sup>3,4,5</sup> The prevalence of cystic lesions of ovary is more in reproductive age group as compared to post-menopausal women.<sup>6,7</sup> Malignant neoplasms have more been observed in an advanced age group.<sup>8,9,10</sup> The current study is aimed to observe the distribution of various histopathological patterns of ovarian lesions in different age groups. This study may be beneficial in stratifying patients, into different risk based groups and prognosis associated groups, depending upon the age of patient at the time of presentation.

**Methods:** Total 150 cases of ovarian lesions were selected by convenient sampling in current descriptive study, carried out at Pathology department of Fatima Jinnah Medical University, Lahore from May, 2019 till June, 2020. Routine H & E stained sections, from specimens of total abdominal hysterectomy with unilateral or bilateral salpingo-oophorectomy, unilateral or bilateral oophorectomy and salpingo-oophorectomy procedures, done either for primary ovarian lesion or other than primary ovarian pathology, in all age groups, were included.

**Results:** A majority of ovarian lesions 123 (82%) were observed in the reproductive age group, mostly being non-neoplastic (89.5%). Out of 19 post-menopausal patients, 12 presented with malignant neoplasms. All patients belonging to pre-pubertal age group had non-neoplastic pathologies.

**Conclusion:** The malignant ovarian tumors are prevalent in post-menopausal patients while reproductive age group predominantly exhibits non-neoplastic and benign ovarian lesions. The pre-pubertal age group commonly present with non-neoplastic ovarian pathologies.

**Keywords:** Histopathological patterns of ovarian lesion, Malignant ovarian tumors, Reproductive age group.

### INTRODUCTION

An age-standardized incidence of ovarian cancer is 5.1, worldwide.<sup>1</sup> A majority of patients presenting with ovarian lesions belong to late adolescence and middle-aged group.<sup>2</sup> The age-estimated prevalence of different ovarian pathologies is an established observation. An age is one of the independent factors in regards to the etiology, associated risks, complications and prognosis in ovarian diseases.<sup>3,4</sup> This has predictive importance, as well as, has helped in the stratification of patients which need to be considered for surveillance, those who require to be searched for other related risk factors and for the planning of therapeutic strategies.<sup>5</sup> The initiation of menarche, ovulation status, reproductive history and menopause are all further elaborating characteristics in regards to the age of the patient suffering from any ovarian lesion.<sup>6</sup> These characteristics account for the predilection of certain ovarian pathologies in respective age groups.<sup>4</sup>

A majority of the patients harboring non-neoplastic lesions and benign ovarian tumors belong to the years of early adolescence and active reproductive life.<sup>6,7</sup> The post-menopausal females present mostly with malignant ovarian neoplasms.<sup>8</sup>

Out of all the ovarian pathologies, tumors have been most commonly encountered lesions.<sup>9</sup> A major proportion of tumors of ovary are comprised of surface epithelial neoplasms.<sup>10,11</sup> Non-neoplastic ovarian lesions, like cystic follicles, follicular and corpus luteal cysts are frequently observed during adolescence and females of reproductive age group.<sup>12</sup> Benign tumors of the ovary are usually asymptomatic and are diagnosed as an unexpected lesion.<sup>13</sup> The germ cell tumors have diversified distribution in terms of age of the patient. Mature cystic teratomas among benign germ cell neoplasms and mixed germ cell tumors among the malignant ones are the most frequent diagnoses in all ages.<sup>7,13</sup> During childhood, out of 60 – 70% of germ cell neoplasms, mature cystic teratomas represent the predominant category.<sup>14</sup> Juvenile granulosa cell tumors account for a large proportion of 10-25% of the sex-cord stromal tumors of pre-menarche age group.<sup>15</sup> Germ cell neoplasms of the ovary affecting at younger age are often

correlated with malignant potential.<sup>12,16</sup> Adult granulosa cell tumors have been frequently noticed type among sex-cord stromal tumors of ovary during adolescence and middle aged females.<sup>16</sup> High grade malignancies have been encountered in ages above 50 years, a large number comprised frequently of high grade serous carcinoma.<sup>17</sup>

Keeping in the above mentioned views, the current study has been conducted to describe the distribution of various ovarian lesions in different age groups. Ovarian pathologies are represented through diversified histopathology patterns, which form the basis of categorization of these lesions into neoplastic and non-neoplastic categories. Different age groups harbor predilection for certain ovarian lesions. The respective risk factors along with relevant prognosis varies, dependent upon the age group involved.

### MATERIALS & METHODS

A total of 150 random cases of ovarian lesions were included in current study, by adopting convenient sampling method. This study was carried out at Pathology department of Fatima Jinnah Medical University, Lahore from May, 2019 till June, 2020. Female patients of all ages having any sort of ovarian lesions were part of this study. Sections from ovaries harboring different ovarian pathologies were taken from specimen of total abdominal or vaginal hysterectomy with unilateral or bilateral salpingo-oophorectomy, unilateral or bilateral oophorectomy and salpingo-oophorectomy procedures, done either for primary ovarian lesion or other than primary ovarian pathology. The recurrent or metastatic lesions of the ovary were excluded. Routine H & E stained sections<sup>18</sup> were prepared from grossly evident pathology in ovary/ies, including cystic, papillary, solid, and myxoid areas, ovarian capsule, invasive foci and abnormal areas. In addition history of age of menarche and menopause was included in this study. The step-wise approach in carrying out the current study, starting from the selection of the cases, grossing, staining and diagnosis, was done under the supervision of my honorable

supervisor and one of the consultants and senior colleagues. Malignant neoplasms were diagnosed and classified by adopting W.H.O. classification criteria.<sup>19</sup>

Data was statistically analyzed by using SPSS-20. Frequencies and percentages were stated in tabulated form and bar-graph.

**RESULTS**

In current study, Table-1 reveals more than three fifth of the patients have age between 31-50 years and around three fourth of the participants are married. Most common type of specimen to assess histo-pathological lesions of ovaries has been total abdominal hysterectomy with bilateral salpingo-oophorectomy (41.3%). Right sided lesions (59.3%) are more prevalent in patients presenting with different ovarian pathologies. Also, around three fifth of the (ovarian) lesions were non-neoplastic (56%).

Table – 01: Frequencies of different parameters of patients.

| Variable                                     | Responses                              | Frequency | Percentage |
|----------------------------------------------|----------------------------------------|-----------|------------|
| <b>Age</b>                                   |                                        |           |            |
|                                              | Up to 10 years                         | 6         | 4.0        |
|                                              | 11-20 years                            | 8         | 5.3        |
|                                              | 21-30 years                            | 24        | 16.0       |
|                                              | 31-40 years                            | 59        | 39.3       |
|                                              | 41-50 years                            | 36        | 24.0       |
|                                              | 51-60 years                            | 10        | 6.7        |
|                                              | 61-70 years                            | 7         | 4.7        |
| <b>Marital Status</b>                        |                                        |           |            |
|                                              | Married                                | 112       | 74.7       |
|                                              | Unmarried                              | 38        | 25.3       |
| <b>Specimen Type</b>                         |                                        |           |            |
|                                              | Unilateral Oophorectomy                | 57        | 38.0       |
|                                              | Unilateral Salpingo-Oophorectomy       | 16        | 10.7       |
|                                              | Bilateral Salpingo-Oophorectomy        | 5         | 3.3        |
|                                              | TAH + Unilateral Salpingo-Oophorectomy | 10        | 6.7        |
|                                              | TAH + Bilateral Salpingo-Oophorectomy  | 62        | 41.3       |
| <b>Laterality</b>                            |                                        |           |            |
|                                              | Right                                  | 89        | 59.3       |
|                                              | Left                                   | 32        | 21.3       |
|                                              | Bilateral                              | 29        | 19.3       |
| <b>Classification of Ovarian Pathologies</b> |                                        |           |            |
|                                              | Non-Neoplastic                         | 84        | 56.0       |
|                                              | Benign Neoplasm/Tumor                  | 35        | 23.3       |
|                                              | Malignant Neoplasm/Tumor               | 31        | 20.7       |

Note. n = 150 Women with Ovarian Lesions/pathologies

The above table also shows that around four fifth (82%) of participants were in reproductive age group i.e. if patients are broadly categorized in three age groups mainly based upon age of initiation of menstrual cycle and menopause, then, age group from birth till age of 10 years, mostly comprised of pre-menstrual females; group having 11 to 50 years of age composed of mainly

ovulating and reproductive females and majority patients belonging to age group 51 and above were post-menopausal females.

Table – 02: Cross-tabulation showing distribution of various categories of ovarian pathologies in different ages.

| Age            | Frequencies (Percentages) of Types of Ovarian Pathologies |                        |                           |               |
|----------------|-----------------------------------------------------------|------------------------|---------------------------|---------------|
|                | Non-Neoplastic (N=84)                                     | Benign Neoplasm (N=35) | Malignant Neoplasm (N=31) | Total (N=150) |
| Up to 10 years | 6 (7.1)                                                   | 0 (0.0)                | 0 (0.0)                   | 6 (4.0)       |
| 11-20 years    | 5 (5.95)                                                  | 2 (5.7)                | 1 (3.2)                   | 8 (5.3)       |
| 21-30 years    | 17 (20.2)                                                 | 6 (17.1)               | 1 (3.2)                   | 24 (16.0)     |
| 31-40 years    | 39 (46.4)                                                 | 11 (31.4)              | 9 (29.0)                  | 59 (39.3)     |
| 41-50 years    | 17 (20.2)                                                 | 9 (25.7)               | 9 (29.0)                  | 35 (23.3)     |
| 51-60 years    | 0(0.0)                                                    | 6 (17.1)               | 5 (16.1)                  | 11(7.3)       |
| 61-70 years    | 0 (0.0)                                                   | 1 (2.9)                | 6 (19.4)                  | 7 (4.7)       |

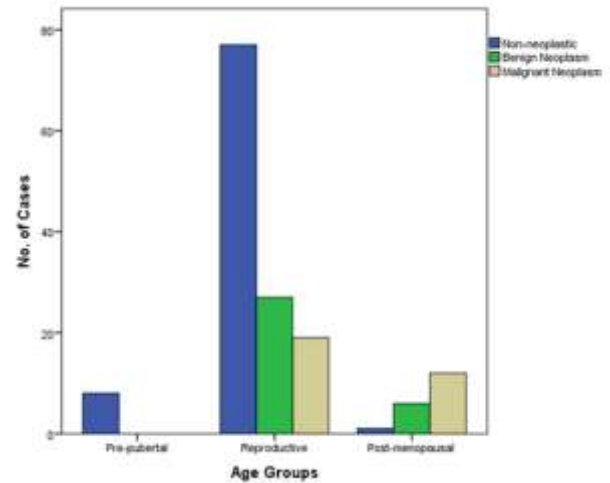


Figure – 01: Distribution of various categories of ovarian pathologies in different ages.

The above table-2 and bar graph (figure-1) depicts that before age of 10 years (pre-pubertal age group) all patients presented with non-neoplastic ovarian lesions. Malignant (ovarian) tumors were predominantly exhibited in reproductive and post-menopausal age groups. However, majority cases in reproductive age group are of non-neoplastic and benign neoplastic nature. While patients above the age of 51 years i.e. in post-menopausal age group had higher prevalence of malignant ovarian tumors.

Different ovarian lesions diagnosed during the current study have been tabulated in table-03, 04 and 05.

The results of the cross-tabulation showed that Follicular Cyst was the most common type of non-neoplastic ovarian tumor with maximum cases reported in the patients of age 31-40 years. Luteal cyst and Endometriosis cases were also prevalent in this age group. The least common type of non-neoplastic ovarian lesion observed was massive edema of ovary.

Table – 03: Cross-tabulation showing distribution of various Non-neoplastic ovarian lesions according to different age groups

| Types of Non-neoplastic Ovarian Lesions | Frequencies (Percentages) in different Age groups |                   |                    |                    |                    |                   |                   | Total (N=84) |
|-----------------------------------------|---------------------------------------------------|-------------------|--------------------|--------------------|--------------------|-------------------|-------------------|--------------|
|                                         | Up to 10 years (N=6)                              | 11-20 years (N=5) | 21-30 years (N=17) | 31-40 years (N=39) | 41-50 years (N=17) | 51-60 years (N=0) | 61-70 years (N=0) |              |
| Follicular Cyst                         | 5 (83.3)                                          | 4 (80.0)          | 13 (76.5)          | 29 (74.4)          | 11 (64.7)          | 0 (0.0)           | 0 (0.0)           | 62 (73.8)    |
| Luteal Cyst                             | 0 (0.0)                                           | 0 (0.0)           | 0 (0.0)            | 3 (7.7)            | 1 (5.9)            | 0 (0.0)           | 0 (0.0)           | 4 (4.8)      |
| Endometriotic Cyst                      | 0 (0.0)                                           | 0 (0.0)           | 2 (11.8)           | 1 (2.6)            | 4 (23.5)           | 0 (0.0)           | 0 (0.0)           | 7 (8.3)      |
| Infarction due to Torsion               | 1 (16.7)                                          | 1 (20.0)          | 0 (0.0)            | 0 (0.0)            | 0 (0.0)            | 0 (0.0)           | 0 (0.0)           | 2 (2.4)      |
| Endometriosis                           | 0 (0.0)                                           | 0 (0.0)           | 1 (5.9)            | 6 (15.4)           | 1 (5.9)            | 0 (0.0)           | 0 (0.0)           | 8 (9.5)      |
| Massive Edema of Ovary                  | 0 (0.0)                                           | 0 (0.0)           | 1 (5.9)            | 0 (0.0)            | 0 (0.0)            | 0 (0.0)           | 0 (0.0)           | 1 (1.2)      |

Note. n = 84 Women with Non-neoplastic Ovarian Lesions

Table – 04: Cross-tabulation showing distribution of different types of Benign Ovarian Tumors according to Age Groups

| Types of Benign Ovarian Tumors | Frequencies (Percentages) in Age Groups |                   |                    |                   |                   |                   |              |
|--------------------------------|-----------------------------------------|-------------------|--------------------|-------------------|-------------------|-------------------|--------------|
|                                | 11-20 years (N=2)                       | 21-30 years (N=6) | 31-40 years (N=11) | 41-50 years (N=9) | 51-60 years (N=6) | 61-70 years (N=1) | Total (N=35) |
| Mature Cystic Teratoma         | 0 (0.0)                                 | 6 (100.0)         | 3 (27.3)           | 1 (11.1)          | 4 (66.7)          | 0 (0.0)           | 14 (40.0)    |
| Serous Cystadenofibroma        | 0 (0.0)                                 | 0 (0.0)           | 1 (9.1)            | 0 (0.0)           | 0 (0.0)           | 0 (0.0)           | 1 (2.9)      |
| Fibroma                        | 2 (100.0)                               | 0 (0.0)           | 0 (0.0)            | 0 (0.0)           | 0 (0.0)           | 0 (0.0)           | 2 (5.7)      |
| Thecoma                        | 0 (0.0)                                 | 0 (0.0)           | 0 (0.0)            | 0 (0.0)           | 2 (33.3)          | 0 (0.0)           | 2 (5.7)      |
| Mucinous Cystadenoma           | 0 (0.0)                                 | 0 (0.0)           | 5 (45.5)           | 5 (55.6)          | 0 (0.0)           | 0 (0.0)           | 10 (28.6)    |
| Serous Cystadenoma             | 0 (0.0)                                 | 0 (0.0)           | 2 (18.2)           | 3 (33.3)          | 0 (0.0)           | 1 (100.0)         | 6 (17.1)     |

Note. n = 35 Women with Benign ovarian Tumors

Table – 05: Cross-tabulation showing Distribution of Different Types of Malignant Tumors according to Age Groups

| Types of Malignant Ovarian Tumors | Frequencies (Percentages) in Age Groups |                   |                   |                   |                   |                   |              |
|-----------------------------------|-----------------------------------------|-------------------|-------------------|-------------------|-------------------|-------------------|--------------|
|                                   | 11-20 years (N=1)                       | 21-30 years (N=1) | 31-40 years (N=9) | 41-50 years (N=9) | 51-60 years (N=5) | 61-70 years (N=6) | Total (N=31) |
| Endometrioid Carcinoma            | 0 (0.0)                                 | 0 (0.0)           | 0 (0.0)           | 0 (0.0)           | 0 (0.0)           | 3 (50.0)          | 3 (9.7)      |
| Serous Papillary Carcinoma        | 0 (0.0)                                 | 0 (0.0)           | 0 (0.0)           | 0 (0.0)           | 0 (0.0)           | 2 (33.3)          | 2 (6.5)      |
| Dysgerminoma                      | 0 (0.0)                                 | 0 (0.0)           | 7 (77.8)          | 3 (33.3)          | 0 (0.0)           | 0 (0.0)           | 10 (32.3)    |
| Mixed Germ Cell Tumor             | 0 (0.0)                                 | 0 (0.0)           | 0 (0.0)           | 3 (33.3)          | 0 (0.0)           | 0 (0.0)           | 3 (9.7)      |
| Malignant Brenner Tumor           | 0 (0.0)                                 | 0 (0.0)           | 0 (0.0)           | 1 (11.1)          | 1 (20.0)          | 0 (0.0)           | 2 (6.5)      |
| Adult Granulosa Cell Tumor        | 0 (0.0)                                 | 1 (100.0)         | 2 (22.2)          | 1 (11.1)          | 1 (20.0)          | 0 (0.0)           | 5 (16.1)     |
| Juvenile Granulosa Cell Tumor     | 1 (100.0)                               | 0 (0.0)           | 0 (0.0)           | 0 (0.0)           | 0 (0.0)           | 0 (0.0)           | 1 (3.2)      |
| Mucinous Cystadenocarcinoma       | 0 (0.0)                                 | 0 (0.0)           | 0 (0.0)           | 1 (11.1)          | 1 (20.0)          | 0 (0.0)           | 2 (6.5)      |
| Serous Cystadenocarcinoma         | 0 (0.0)                                 | 0 (0.0)           | 0 (0.0)           | 0 (0.0)           | 1 (20.0)          | 1 (16.7)          | 2 (6.5)      |
| Mixed Mullerian Tumor             | 0 (0.0)                                 | 0 (0.0)           | 0 (0.0)           | 0 (0.0)           | 1 (20.0)          | 0 (0.0)           | 1 (3.2)      |

Note. n = 31 Women with Malignant Ovarian Tumors

As shown in Table-04 that benign surface epithelial tumors including Serous cystadenoma (17.1%), Serous cystadenofibroma (2.9%) and Mucinous cystadenoma (28.6%) collectively account for most commonly encountered ovarian neoplasms. All of the benign surface epithelial neoplasms have been encountered during reproductive age group (Table-04). Fibroma is observed in younger patients. Mature cystic Teratoma (40%) accounts for one of the commonest benign tumors in present study.

The results of cross-tabulation (Table-05) showed that out of 150 women with ovarian lesions, tumors of 31 patients were malignant with most cases having age between 31-50 years. Dysgerminoma was the most common type of malignant tumor with maximum patients of age between 31-40 years. In age group between 61 to 70 years, commonly seen malignant tumor of ovary had been endometrioid tumor (50%). The least common types of malignant tumor reported in the patients were Juvenile Granulosa cell tumor and Mixed Mullerian Tumor. Juvenile Granulosa cell tumor accounts for the only malignant tumor observed in early years of adolescence. No border-line tumors or stromal lesions have been seen in present study. None of malignant neoplasms of ovary has been observed in patients of pre-pubertal age group i.e. before 10 years of age.

## DISCUSSION

In current study (Table-01) a majority of patients presented with ovarian pathologies during their reproductive years of life as has been mentioned by several studies.<sup>6,8,10</sup> As stated by *Mondal SK et al*, right sided ovary has more vulnerability for involvement by any type of pathology as has been observed in present study (Table-01).<sup>9</sup> A majority of patients were married who had different ovarian lesions (Table-01), an observation also made by *Zheng G et al*.<sup>5</sup> In the study by *Begum S et al*, a large number of patients harboring both benign and malignant ovarian tumors had ages between 21 and 46 years, as mentioned in Table-01.<sup>2</sup> In table-02, female patients presenting with non-neoplastic and benign and malignant neoplasms of ovary were belonged to ages between 21 to 50 years, as have been observed in several studies.<sup>2,10,11</sup> The reproductive age group harbors all variety of ovarian lesions while pre-pubertal age group harbors mostly non-neoplastic (ovarian) pathologies (Fig-01), are same observations also made by *Rasheed F et al* and *Northridge JL*.<sup>3,16</sup>

Similar to other studies, current study also mentioned that follicular cysts of ovary are common non-neoplastic lesion (73.8%)

and is prevalent in females during reproductive years of their lives (Table-03).<sup>6,7,13</sup> As noticed in this study (Table-03) that ovarian torsion resulting in infarction is more common in age earlier than menarche, has been stated in another study.<sup>15,20</sup>

As documented in table-04, mature cystic Teratoma accounts for most common benign tumor being observed in ages between 21 to 60 years, has concordance with other studies.<sup>7,21</sup> One of the benign tumors, Thecoma has been seen in postmenopausal age group (Table-04) is similarly documented by *Arteaga E et al*.<sup>22</sup> Benign surface epithelial tumors of ovary occupied almost half of all the diagnoses among benign tumors seen during current study (Table-04), as has been stated in other studies.<sup>7,17</sup>

Juvenile granulosa cell tumors accounting for a large proportion of 10-25% of the sex-cord stromal tumors of pre-menarche age group was documented in certain studies,<sup>12,16</sup> while in contrary, present study revealed same tumor in a decade later age group (Table-05). Among all ovarian malignant tumors shown above 61 years of age, endometrioid tumor was most prevalent in current study (Table-05) and is in concordance with other studies.<sup>4,10,23</sup> Similar to results of this study depicted in table-05, other studies also stated Dysgerminoma as most common malignant tumor.<sup>2,10,11</sup>

## CONCLUSION

The malignant ovarian tumors are prevalent in post-menopausal patients while reproductive age group predominantly exhibits non-neoplastic and benign ovarian lesions. The pre-pubertal age group commonly present with non-neoplastic ovarian pathologies.

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