

Original Research Article

Prevalence of Ovarian Cancer and Its Correlation with Age in Pakistan

Muhammad Waqar Mazhar^{1*}, Saira Saif¹, Asma Taj¹, Sohail Waris¹, Abdul Manan¹, Muhammad Irfan¹, Javaria Mahmood¹, Hira Tahir³, Fatima Mazhar²

Abstract

¹Department of Bioinformatics and Biotechnology, Government College University, Faisalabad, Pakistan.

¹Department of Bioinformatics and Biotechnology, Government College University, Faisalabad, Pakistan.

²Muhammad Nawaz Sharif University of Agriculture, Multan, Pakistan

³University of Health Sciences, Lahore, Pakistan.

*Corresponding Author Email:
waqarmazhar63@gmail.com
+923012222861

Orcid id: <https://orcid.org/0000-0003-4480-2868>

A group of diseases that originate from the different parts of ovaries and cause production of abnormal cells that divide uncontrolled themselves in the ovaries is known as ovarian cancer. OC is mainly classified into majorly three types on the base of three components of ovaries known as epithelium, stroma and germinal cells. Approximately, 7000 women develop OC and 4200 of them die every year in the UK. In Pakistan, the incidence of OC is increasing at the rate of around 13.6%. Approximately 70% cases are diagnosed at later stages. The blood sample was collected in the Layyah region. The CA125 identification through Elisa technique for their better identification on the basis of antibodies. Normal values of CA125 were considered less than 35 U/ml. The other tumor markers were also measured such as fibrinogen, prolactin, CA15.3, PT, APTT, INR, D Dimer, and CA19.9. The mean age of patients was 59.0 ± 8.1 while the minimum and maximum age at which the tumor marker detection was 22 and 74 years. The number of patients was found in order of $25 > 24 > 10$ in 1st, 2nd and 3rd age groups, respectively. The clinical histopathological test in the ovarian cancer patients show that the tumor size 5.21 ± 3.42 , fibrinogen 5.09 ± 1.29 , CA-199 (U/mL) 121.17 ± 59.76 , and D-dimer 0.61 ± 0.31 . The CA-125 level increase in ovarian cancer patients is indicated as a tumor marker.

Keywords: CA19.9, CA-125, Ovarian cancer, Prolactin level, Transvaginal ultrasound

INTRODUCTION

A group of diseases that originate from the different parts of ovaries and cause production of abnormal cells that divide uncontrolled themselves in the ovaries is known as ovarian cancer (OC). OC is mainly classified into majorly three types on the base of three components of ovaries known as epithelium, stroma and germinal cells. First type of OC that arises due to malignancy in epithelial cells is known as epithelial cell carcinoma. Second type of OC that causes tumors in germinal cells is known as germ cell tumor. The cell tumors are rare and tend to occur at younger ages. Third one is the sex cord-stromal tumor that occur in stromal part of the ovary that is usually diagnosed at earlier stage as compared to other

type of ovarian cancer (Shimosato et al., 2010). Among all ovarian cancers, epithelial ovarian cancer is the most common form of cancer in women. The epithelial ovarian cancer is the fourth main cause of women's death in the developed world. Epithelial cancer has many other subtypes such as serous carcinoma and mucinous carcinoma (Williams et al., 2007).

Globally, it is estimated approximately 220,000 women develop epithelial ovarian cancer each year. Worldwide the seven most common types of malignant neoplasm in women is the OC and eightieth major cause of mortality in women (Melikechi et al., 2016). Approximately, 7000 women develop OC and 4200 of them die every year in

UK. It has been estimated that, in the USA roundabout 22,500 women develop OC and 14,000 of them die every year (Jayson et al., 2014). In Pakistan the incidence of OC is increasing at the rate of around 13.6%. Approximately 70% cases are diagnosed at later stages. The higher rate of death by developing OC is due to post symptoms that appear later. This disease remains metastatic within the abdomen at initial stages. The women of 50-70 years old have expected to be higher rate to develop OC as compared to younger ones (Sung et al., 202).

The exact mechanism of the proliferation of the ovarian cancer is unknown to the doctors although the rearesomethingsthatareidentifiedandincreasetheriskofovariancancer. One of the main causes of ovarian cancer is the mutation in the DNA in the cells of ovaries or the cells near the ovaries. As the replication and mitosis of the cell is also controlled by the DNA, so mutation in DNA brings some changes and the cell divides and multiplies very quickly to form the mass of cancerous cells. These cancerous cells invade nearby tissues and metastasize the tumors to the other part of the body.

Small percentage of ovarian cancers are caused by the inheritance of the gene changes by parents to offspring. But the risk of ovarian cancer with blood relatives diagnosed with ovarian cancer increases the risk in other blood relatives (Xing et al., 2019).

There are some genes that increase the risk of ovarian cancer in women, including BRCA1 and BRCA2. These two genes also increase the risk of breast cancer in females (Mazhar 2021). There are several other gene changes that are known to increase the risk of the ovarian cancer, including gene changes associated with lynch syndrome and BRIP1, RAD51C and RAD51D genes (Andrews and Mutch, 2017).

Another cause of ovarian cancer is obesity. The risk of ovarian cancer increases with the increase of weight (Olsen et al., 2013).

Ovarian cancer is usually asymptomatic at an early stage. Some of the signs that appear as early warning signs include abdominal bloating or swelling, weight loss discomfort in the pelvic area, fatigue, back pain and frequent need to urinate. Few signs that appear at a later stage of ovarian cancer include irregular menstruation, difficulty in eating and urinary issues (Allen, 2010).

There is no proper treatment for ovarian cancer although there are some preventative measures that are suggested include exercise and diet, oral contraceptives, avoiding carcinogens, avoiding pregnancy and breastfeeding and lifestyle. By doing weekly exercise and consuming a healthy diet, the risk of ovarian cancer decreases. It is estimated that by working 30 minutes every day the ovarian cancer risk may decrease up to 20% (Katzke et al., 2015). By eating food containing vitamin D and vitamin A also decreases the chances of ovarian cancer. It has been studied the women that takes oral contraceptives have 50% lower risk of developing

ovarian cancer. The substances that induce cancer are known as carcinogens e.g Talcum powder that is found in everyday products such as baby powder, make up and vaginal deodorants. By avoiding these carcinogens, the risk of ovarian cancer can be reduced. Pregnancy and breastfeeding also decreases the risk of developing ovarian cancer (Omoyajowo et al., 2021). It has been studied, women who have borne one child before the age of 30, have a low chance of ovarian cancer. The women that breastfeed their children also have low risk of ovarian cancer. Avoidance from tobacco as well as alcohol consumption also reduced the risk of ovarian cancer (Modugno et al., 2019).

There are two main tests that were performed to identify and screen for ovarian cancer are transvaginal ultrasound (TVUS) and CA-125 blood test. TVUS uses sound waves to examine different parts of the ovaries such as uterus and fallopian tubes by putting an ultrasound wand into the vagina. Another test to screen out cancerous patients is cancer antigen (CA-125). CA-125 is a protein that's the level of patients affected with cancer. SO, CA-125 is a tumor marker to screen out cancerous patients, hence this test is known as tumor marker test.

MATERIALS AND METHOD

The blood sample was collected in the Layyah region. There were 59 patients that belong to different areas of Layyah district. The patient was recommended by a gynecologist and oncologist from the radiology department and histopathology department. The blood sample was put into gel vials and the vials were centrifuged at 3000rpm for 5 minutes. After that serum was extracted from all the collected blood samples individually. The CA125 identification through Elisa technique for their better identification on the basis of antibodies. Normal values of CA125 were considered less than 35 U/ml. the other tumor markers were also measured such as fibrinogen, prolactin, CA15.3, PT, APTT, INR, D Dimer, and CA19.9.

Sensitivity defined as the CA 125 identification in the patient was proportional with ovarian cancer. And the specificity of the patient proportional without ovarian cancer identified with CA125 test.

RESULTS

The sample of 59 patients belonging to Layyah district are as were used in molecular detection of tumor markers. The mean age of patients was 59.0 ± 8.1 while the minimum and maximum age at which the tumor marker detection was 22 and 74 years, respectively (table 1).

The age was categorized into 3 groups, 15-35, 36-55

Table 1. Minimum and maximum age of ovarian cancer patients collected from Layyah district.

Sr. No	Patient Data	Patient Age
1	Minimum age	22
2	Maximum Age	74
Mean ±S.E		59.0 ± 8.1

Table 2. Distribution of CA-125 in ovarian cancer patient by age group.

Age	Percentage (%)
15-35	(n=25)
Ca125- positive cases	08 (32.00%)
Negative	17 (68.00%)
36-55	(n=24)
Ca125- positive cases	19 (79.16%)
Negative	05 (20.83%)
above 56	(n=10)
Ca125- positive cases	08 (80.00%)
Negative	02 (20.00%)

Table 3. Histopathological and clinical data of ovarian cancer patients.

Variable	Age(years)	59.00±8.1
	Tumorsize(cm)	5.21±3.42
	Fibrinogen(g/L)	5.09±1.29
	CA-199(U/mL)	121.17±59.76
	D-dimer(mg/L)	0.61±0.31

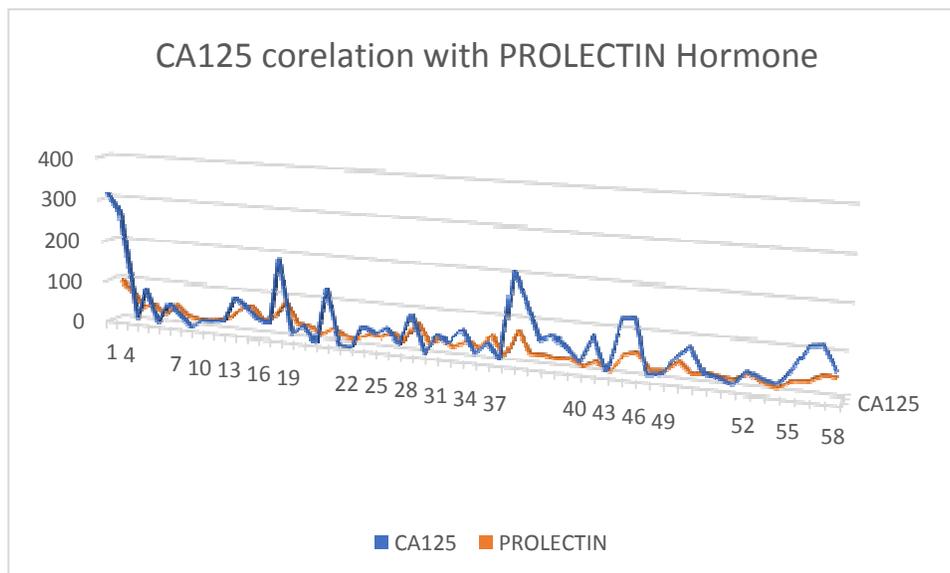


Figure 1. CA125 correlation with PROLECTIN Hormone

and above 56 age formed 1st, 2nd and 3rd group. Number of patients in age groups 15-35, 36-55, and above 61 were, 25, 24 and 10, respectively. The no. of

patients was found in order of 25>24>10 in 1st, 2nd and 3rd age groups, respectively. The highest no. of CA-125 patient (77) were found in the 1st group while the lowest

patients (19) were found in the 2nd group. The 08 (32.00%) patients showed the detection of CA-125 while 17 patients (68.00%) showed no amplification belonging to the 1st age group. The 19(79.16%) patients showed detection of CA-125 while 05 patients (20.83%) showed no detection belonging to the 2nd age group. The 08(80.00%) patients showed detection of CA-125 while 02 patients (20.00%) showed no detection genes belonging to the 3rd age group. 35(59.32%) out of 59 were ca125 positive cases while 24 individuals were negative. (Table 2).

The clinical histopathological test in the ovarian cancer patients show that the tumor size 5.21 ± 3.42 , fibrinogen 5.09 ± 1.29 , CA-199 (U/mL) 121.17 ± 59.76 , and D-dimer 0.61 ± 0.31 see in table.3.

The prolactin level also increases in females that have ovarian cancer, their correlation with others discussed in the next article. The CA-125 level increase in ovarian cancer patients is indicated as a tumor marker. In this study results show that the CA-125 is directly proportional with prolactin level in ovarian cancer patients see in Figure 1

DISCUSSION

In this study the patients were analyzed for ovarian cancer. Two major tests were performed to examine ovarian cancer that include CA-125 and TVUS (Transvaginal ultrasound). Cancer antigen test is the best marker for the screening of the ovarian cancer patient. It was seen that the patients having age above the 45 years have higher risk to develop ovarian cancer. Approximately, all the patients belong to the industrial area from whose sample was collected. So, it may be due to carcinogenic chemicals from industrial effluents. It may be due to DNA mutations. These mutations ultimately pass to blood relatives and can cause ovarian cancer in them.

Second test performed in this study is the TVUS that is usually used to examine the size of ovarian cancer. It is usually performed with the help of ultrasound wand that uses sound waves to examine the different parts of the ovaries such as uterus and fallopian tubes. This test was performed to detect the epithelial ovarian cancer that is the most common form of the cancer in females. The patients in which CA-125 is detected were seen to have high levels of prolactin. The increase in prolactin concentration enhances the mortality rate of cancerous cells. So, we can conclude that risk of ovarian cancer is also associated with the prolactin concentration that usually increases the life span of the cancerous cells.

Conflict of interest

The authors declare no conflict of interest.

Funding: No funds

REFERENCES

- Allen PL (2010). *Prospective study of symptoms of ovarian cancer in postmenopausal women*. UCL (University College London).
- Andrews L, DG Mutch (2017). *Hereditary ovarian cancer and risk reduction*. Best practice & research Clinical obstetrics & gynaecology, 41: p.31-48.
- Jayson GC, et al., (2014). Ovarian cancer. *The lancet*, 384(9951): p.1376-1388.
- Katzke VA, R. Kaaks, T. Kühn (2015). Lifestyle and cancer risk. *The Cancer Journal*, 21(2):p. 104-110.
- Mazhar, M. W. (2021). "breast cancer." *Cancer Therapy & Oncology International Journal*18(4).
- Melikechi N, et al. (2016). *Age-specific discrimination of blood plasma samples of healthy and ovarian cancer prone mice using laser-induced breakdown spectroscopy*. Spectrochimica Acta Part B: Atomic Spectroscopy, 123: p. 33-41.
- Modugno F., et al. (2019). Breastfeeding factors and risk of epithelial ovarian cancer. *Gynecologic oncology*, 153(1): p. 116-122.
- Olsen CM, et al., (2013). *Obesity and risk of ovarian cancer subtypes: evidence from the Ovarian Cancer Association Consortium*. *Endocrine-Related Cancer*, 20(2): p.251-262.
- Omoyajowo KO, et al.,(2021). Awareness of Toxicological Impact and Risk of using Talcum Powder as a factor for Ovarian Cancer among Women in three Metropolitan Cities of Southwestern States of Nigeria.
- Shimosato Y, K. Mukai, Y. Matsuno (2010). Tumors of the mediastinum.: Amer Registry of Pathology.
- Sung H., et al. (202). *Global cancer statistics 2020: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries*. CA: A Cancer J, Clinic, 71(3): p.209-249.
- Williams TI, et al. (2007). *Epithelial ovarian cancer: disease etiology, treatment, detection, and investigational gene, metabolite, and protein biomarkers*. J. Proteome Res. 6(8): p. 2936-2962.
- Xing F, S. Wang, J. Zhou (2019). *The expression of microRNA-598 inhibits ovarian cancer cell proliferation and metastasis by targeting URI*. *Molecular Therapy-Oncolytics*, 12: p.9-15.