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# Evaluation The Tumor Marker (Ca125, Ca19-9) In Detecting Ovarian Cancer

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## ABSTRACT

Ovarian cancer is a medical condition that is characterized by abnormal growth of cells in one or both ovaries. There are many biomarkers to detect it,monitor its stages, and evaluate the effectiveness of treatment, including tumor markers(CA125,CA19-9).These biomarkers are considered sensitive and specific to evaluate the effectiveness of treatment and the stage of the disease. We collected information on 27 samples of women with ovarian cancer in Hama and Homs governorates on1/2/2024and1/6/2024.The information was divided according to age,stage,CA125andCA19-9values.The tumor was placed and the data was analyzed to evaluate these predictive factors during the various stages of the disease using the statistical package for the social science program. It was showed that age is not a predictive factor in determining the stage of the disease but the indicator CA125 was an influential factor in determining the stage while the indicator CA19-9was not significant influential factor. Age was an influential factor at the CA125 and CA19-9 levels.

**KEYWORDS:** Ovarian Cancer, CA125, CA19-9, Stage, Age.

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# 1. Introduction

Ovarian cancer (silent killer) is the seventh leading cause of cancer-related deaths in women, and the leading cause of cancer related deaths worldwide, although ovarian cancer was previously supposed to be a single entity, the term now refers to a variety of ovarian cancers (epithelial ovarian cancer, non-epithelial ovarian cancer, germ cell tumors) [1] .

The majority of signs and symptoms of ovarian cancer are nonspecific (e.g., bloating, back pain, indigestion, early satiety) and appear primarily in the later stages of the disease. Furthermore, distinguishing between harmful and benign ovarian tumors is a challenge and this differential diagnosis is often made only after histological examination [2].

The lack of effective and sensitive signs of early-stage ovarian cancer contributes significantly to high mortality rates, so it is called the silent killer Since late diagnosis of ovarian cancer is one of the leading causes of death, an effective screening technique that can detect ovarian cancer in the early stages may have a significant impact on improving survival rates [2-3].

## 1.1. Stages of ovarian cancer

### 1.1.1 First Stage

In the first stage, the cancer is confined to the ovaries and has not spread to the abdomen, pelvis or lymph nodes nor to distant sites. It is considered early-stage cancer, which means it provides the highest survival rate.

### 1.1.2 Second Stage

In stage two, cancer has spread from one or both ovaries to other areas of the pelvis. However, the cancer has not spread to nearby lymph nodes or distant sites.

### 1.1.3 Third Stage

In stage three , the cancer spread to nearby lymph nodes and/or other parts of the abdomen, but did not spread to distant locations.

### 1.1.4 Fourth Stage

In stage four , cancer has spread beyond the abdomen. This is considered metastatic cancer, which means that the cancer is found in areas outside the initial cancer zone [4].

# 2. Diagnosis

The diagnosis of ovarian cancer begins with a physical examination (including a pelvic examination) and transvaginal ultrasound. Sometimes a rectal-vaginal exam is used to help plan surgery and blood testing for CA125 and CA19-9 and sometimes other markers. The diagnosis must be confirmed by surgery to examine the abdominal cavity, take biopsies (tissue samples for microscopic analysis) and look for cancer cells in the abdominal fluid this helps determine whether the ovarian mass is benign or malignant. It is difficult to diagnose the early stages of ovarian cancer (stage II,I). Because most symptoms are nonspecific and therefore of little use in diagnosis; as a result, they are rarely diagnosed until they spread to later stages

(stage IV, III). In addition, ovarian cancer symptoms may look similar to irritable bowel syndrome. In patients with whom pregnancy is possible, candidiasis that can be felt is also a sign of ovarian cancer in women after the age of Hopelessness, but the most common biomarker for the detection of ovarian cancer is cancer antigen CA125 and cancer antigen CA19-9 [4]**.**

### 2.1 Carbohydrate Antigen 125 (CA125)

Also known as carbohydrate antigen 125, it is the most important marker for the screening, detection and management of ovarian cancer over the past four decades and is a high molecular weight mucoglycoprotein found on the surface of ovarian cancer cells. This antigen is dumped and measured in the serum of ovarian cancer patients.[5] The CA125 serum lacks sensitivity and specificity as its levels are high in a variety of non-ovarian malignancies such as cervical, colon cancer, rectal cancer, endometrial cancer and lung cancer. Therefore, its not useful as a single biomarker for early diagnosis of ovarian cancer. However, CA125 levels after surgery and during treatment are crucial for evaluating the effectiveness of treatment and diagnosis.[6] Serum CA125 levels have been shown to be elevated in 50% of early-stage tumors (mainly type I ovarian cancer) and 92% of advanced stage tumors (mainly type II ovarian cancer). Furthermore, CA125 is elevated in other cancers or benign cases [7].

### 2.2 Carbohydrate Antigen 19-9 (CA19-9)

Carbohydrate antigen 19-9 is a glycoprotein found on the surface of cells caused by a variety of epithelial malignancies and is a marker of pancreatic cancer, colon cancer, hepatocellular carcinoma, and rectal tumors. But the level of CA19-9 increases significantly in patients with benign, early and late ovarian cancer compared to levels of CA19-9 in healthy patients. Moreover, CA19-9 levels in ovarian cancer patients were significantly higher than levels of CA19-9 in benign ovarian diseases [8].

## 3. Patients and Methods

The study sample consists of 27 women with ovarian cancer, between the ages of 29 and 82 years. Most of the patients are housewives 23 cases, while you have 3 cases of employees and teachers and only one case is retired. In terms of social status, 24 cases were married, And 3 single cases. For smokers, only 6 cases were smokers.

The stages of the disease (stage) varied among the patients, where there were 4 cases in the first stage,4 cases in stage two , 8 cases in stage three and 11 cases in stage four.

As for the basis of diagnosis, 14 cases were diagnosed by biopsy, 7 cases by Tumor resection, and 6 cases by other surgery.

As for the location of the tumor, there were 11 cases localized in the ovaries, 9 cases of ovarians left and 7 cases of the right ovary.

All cases received chemotherapy, and the CA125 and CA19-9 indices were measured for all cases.

We studied the predictive factors during different stages of pathological data using the statistical analysis program of the Statistical Package for the Social Sciences (SPSS).

## 4. Results

### 4.1 First: The relationship between age and the stage of the disease

Figure (1) shows the average age according to the disease pathogen, and a analysis of variance (ANOVA) load was performed to see if there were differences between ages based on the stage of the disease and on the results presented, The probability p-value was greater than 0.05 and therefore there were no statistically significant differences between ages based on the stage of the disease. there is no relationship between age and stage of the disease. This finding suggests that age was not an influential factor in determining the stage of ovarian cancer in patients in this study. In other words, there was no significant difference in the average age of patients between the different stages of the pathogen.

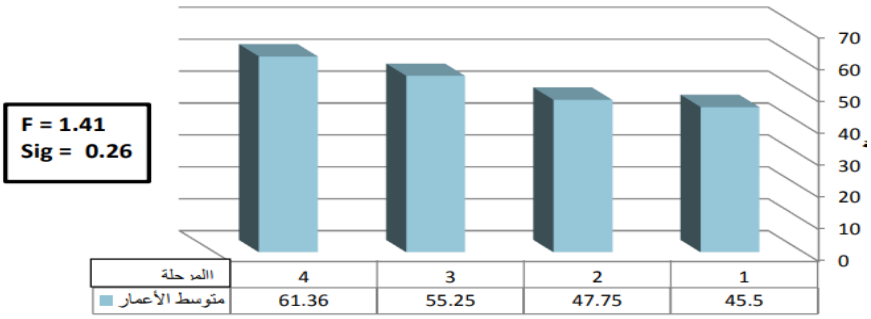



*Figure (1): The relationship between age and stage of disease*

### 4.2 Second: The relationship between the CA125 index and the disease stage

Figure (2) shows the average index of 125CA according to the disease pathogen and the variance load was performed Unidirectional analysis of variance (ANOVA) to see if there are differences between CA125 based on the stage of the disease and based on the results provided. The value of the probability (p-value) was less than 0.05 and therefore there are significant differences in the averages of the 125CA index for patients between the different stages of the disease. That is, there is a relationship between the index of 125CA and the stage of the disease. This result indicates that the index of 125CA was an influential factor in staging ovarian cancer in patients in this study.

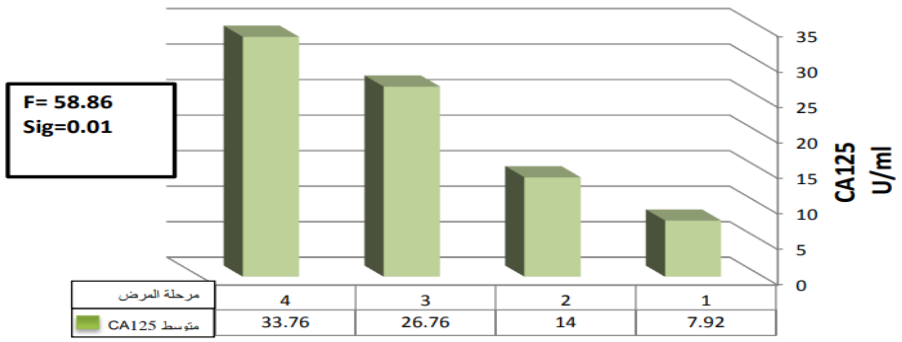



*Figure (2): Relationship between the ca125 index and the disease stage*

## 4.3 Third: The relationship between the CA19.9 index and the disease stage

Figure (3) shows the average index of CA19-9 according to the stage of the disease and the analysis of variance (ANOVA) was performed to see if there were differences between the CA19-9 index on the results presented, the probability value was (based on the stage of the disease) and the construction of p-value greater than (0.05) and therefore there are no differences in the CA19-9 index based on the stage of the disease.That is, there is no relationship between the CA19-9 index and the disease stage. This result indicates that the CA19-9 index was not an influential factor in staging ovarian cancer in patients in this study. In other words, there was no significant difference in the CA19-9 index averages of patients between the different stages of the disease.

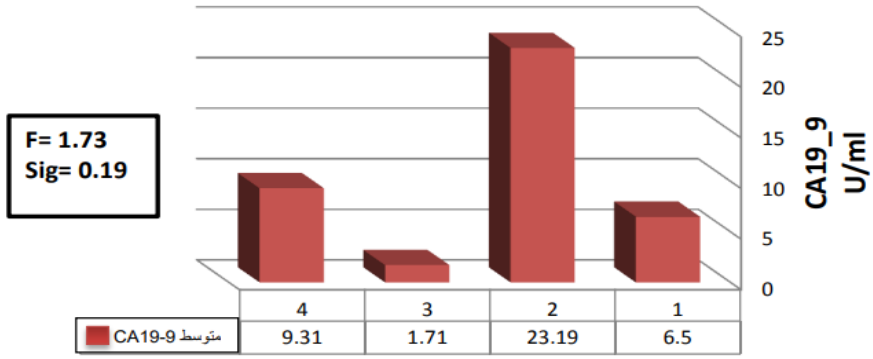



*Figure (3): Relationship between ca19-9 index and disease stage*

## 4.4 Fourth: The relationship between age and the CA125 index

Based on the results presented in Figure (4), there is a statistically significant positive correlation between age and CA125 in ovarian cancer patients in this sample Where the value of Pearson's correlation coefficient was 0.44 and the probability value p-value was equal to 0.02 and a statistically significant value at the level of 0.05 This result indicates a direct correlation between age and the level of CA125 index in the blood of patients. That is, the older the patient, the higher her CA125 index level was expected.

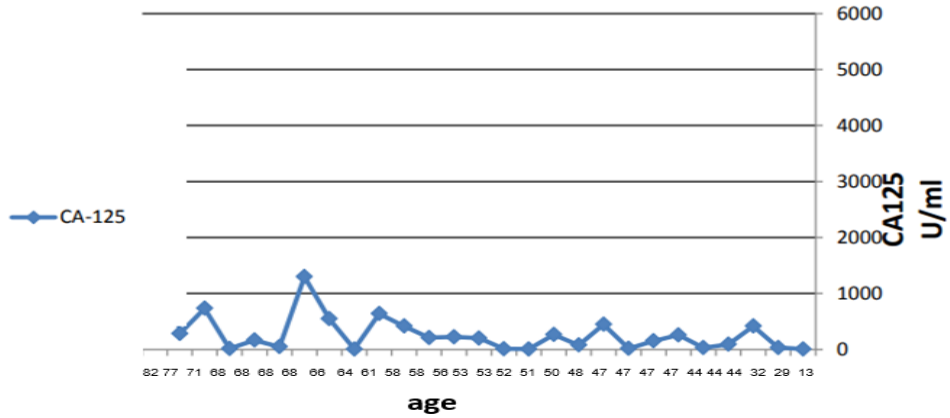



*Figure (4): Relationship between age and ca125 indicator*

## 5. Discussion

Ovarian cancer is a life-threatening malignant tumor in women and is usually diagnosed in menopause, so it is recommended to accurately evaluate predictive factors for the detection of ovarian cancer in order to minimize the adverse effects of post-cancer surgical procedures and preserve fertility for patients. Most previous reports from the United States and European countries indicated that genetic background, race, age, patients biographies and stages of detection affect diagnosis.

Figure (1) shows the relationship between the stages of the disease and the age where our study showed that there are no significant differences between ages based on the stage of the disease and therefore there is no relationship between age and stage of the disease It corresponds to (Yoshikawa et al,2014) where his study showed that younger age as well as older age were not an independent predictor factor for determining disease stage. His study had several limitations: heterogeneous follow-up time and the presence of a variety of treatment protocols such as different chemotherapy regimens and surgery. In his study, he collected data on 1562 patients who were divided into two groups: group A (>40 years) and group B (<40 years) and the median follow-up time was 45.1 months. Group A patients had a significantly higher rate of stage I patients than those in group B. However, there were no statistically significant differences between the two groups (group A versus group B)[9].

On the contrary, (Chan et al,2003) disagreed with his study, where his results showed that younger age was an independent predictor factor for determining the stage of disease. The reason is due to the limited number of patients with stage III and IV disease who were studie and the difference can also be due to the time period in which the research was conducted[10].

We expect our results consistent with (Yoshikawa et al,2014) to be preferable because each patient had a different clinical profile than the other patient even if they showed a similar long-term diagnosis according to the stage of the disease, age has no role in determining the stage due to different clinical symptoms, ethnicity and time period .

Figure (2) shows the relationship between the CA125 index and the disease stage, where our study showed significant differences between CA125 and the disease

stage, and therefore the CA125 index was an influential factor in determining the stage of ovarian cancer .

It also corresponds to (Ali et al,2022) where he showed that the CA125 index rose as the disease progressed. While the study included 120 patients and 30 healthy volunteers, the patients (120) were divided into three groups (the first group was women with benign ovarian tumors; the second group was women with early ovarian cancer (stages II and I); the third group was women with late ovarian cancer (stages IV and III). He measured the levels of the biometric A125 in the serum and the statistical analysis was performed using Excel and SSPS to clarify diagnostic accuracy measures including sensitivity and specificity of CA125 [11].

We expect our results to be better with (Ali et al,2022) because the CA125 biomarker is more sensitive and FDA-approved for ovarian cancer as the abnormal adhesion of CA125 to the tumor surface is enhanced by providing binding sites for ovarian cancer cells to interact with multiple adhesion molecules on the surface of tumor cells compared to normal cells .

Figure (3) shows the relationship between CA19-9 and disease stage, as our study showed that there were no significant differences between the CA19-9 index and the disease stage, and therefore it was not an influential factor in determining the stage of ovarian cancer .

Which contradict (Ali et al,2022) where his results showed that CA19.9 increases steadily in ovarian cancer patients from early to late stage. The reason for this difference is due to the geographical area and the sample of patients where a group of infected women was used with a group of healthy women[11].

We believe that our results regarding the disassociation between the CA19.9 index value and tumor stage are preferable because the CA19.9 biomarker is less specific for ovarian cancer as high levels of it indicate other types of cancer (such as pancreatic and colon cancer) or some non-cancerous disorders including cirrhosis of the liver and gallstones.

Figure (4) shows the relationship between age and CA125, where our data showed significant differences between age and the CA125 index, and this result indicates that the level of CA125 index in the blood of patients with ovarian cancer increases with age.

A study (Sasamoto et al,2019) showed that there is an increase in CA125 values with age, as his study was on 26,000 postmenopausal and white women with a previous smoking condition, where he used progressive regression analysis in his data to develop a predictive model associated with the CA125 biomarker and age, where his study showed that the CA125 biomarker increases with age[12].

On the other hand, the results of the study (Gebhart et al,2023) showed that there is a decrease in CA125 levels with increasing age. The reason is that his study was based on genetic factors as well as environmental factors as they are current and under study[13].

## 6. Conclusions and recommendations

Based on the statistical analysis that we conducted, it was found with us that the younger patients did not have a difference from the older patients in determining the stage of the disease, however, it was found that the older patients had higher CA125

index values than younger patients, in addition to that, it was found that the levels of CA125 were higher in the advanced stages than in the early stages while the CA19-9 index was not an independent predictive factor in determining the stage of the disease.

At the end, we recommend the need to conduct a periodic examination once a year for women with the need to hold educational seminars to raise awareness about the symptoms of ovarian cancer, hoping for early detection of the disease and its management in the early stages, which leads to better treatment and reduce mortality rates.

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