

## Correlation Between Serum CA-125 Levels and Age in Advanced-Stage Epithelial Ovarian Cancer Patients at Dr. Soetomo General Academic Hospital, Surabaya, Indonesia (2021-2022)

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### Abstract

Ovarian cancer is a gynecological malignancy that originates in the ovaries. Symptoms of ovarian cancer often remain unnoticed in its early stages, leading to a diagnosis at an advanced stage. CA-125 is a widely recognized biomarker used in ovarian cancer for diagnosis, monitoring treatment response, and predicting prognosis. Research has shown that CA-125 levels can vary with age and are influenced by multiple biological factors, including hormonal changes and the progression of ovarian cancer. Age-related factors can influence CA-125 levels, which may affect the interpretation of such examination results. This study aims to determine the correlation between serum CA-125 levels and ages in advanced-stage epithelial ovarian cancer patients. This research is a retrospective study using the comparative analytic research method by taking the medical record data of epithelial ovarian cancer with advanced-stage patients treated in oncology clinic of Dr. Soetomo General Hospital Surabaya for January 1, 2021 – December 2022. Based on the analysis of 61 patient subjects categorized into three age groups, the median serum CA-125 levels for patients aged <40 years were 172.85 U/mL, for those aged 40-50 years the median was 261 U/mL, and for patients aged >50 years the median was 116.2 U/mL. The Kruskal-Wallis test (p-value) yielded a result of 0.518, indicating that there was no statistically significant relationship between serum CA-125 levels of patients and patients' age (p = 0.518). In addition, there is no correlation between serum CA-125 levels and age in advanced-stage epithelial ovarian cancer patients at Dr. Soetomo General Hospital, Surabaya.

**Keywords:** Ovarian Cancer; CA-125; Age; Malignancy; Serum Biomarkers

### 1. Introduction

Ovarian cancer is a gynecological malignancy that originates in the ovaries, the female reproductive organs that produce eggs. The majority of ovarian cancers are classified as epithelial ovarian cancer (EOC), which can further be subdivided into various histological subtypes, including serous, endometrioid, clear cell, and mucinous cancers. EOC is the most common form, accounting for a significant proportion of ovarian cancer cases. Symptoms of ovarian cancer often remain unnoticed in its early stages, leading to a diagnosis at an advanced stage. The disease tends to progress slowly but can spread to other regions such as the pelvis or abdomen if undetected [1]. Ovarian cancer is the seventh most common cancer in women and the eighth leading cause of cancer-related death among women worldwide [2].

Carbohydrate Antigen 125 (CA 125), sometimes named as Cancer Antigen 125 or Tumor Antigen 125, is a mucin-type glycoprotein, produced by the MUC16 gene, and associated with the cellular membrane. This biomarker is most often

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used for ovarian lesions [3]. CA-125 is a widely recognized biomarker used in ovarian cancer for diagnosis, monitoring treatment response, and predicting prognosis. Its primary role involves evaluating tumor dynamics in epithelial ovarian cancer [4]. Research has shown that CA-125 levels can vary with age and are influenced by multiple biological factors, including hormonal changes and the progression of ovarian cancer. Factors such as a woman's age, age at menarche, age at menopause, and history of ovarian cysts are also associated with fluctuations in CA-125 levels [5].

Patient age is associated with the prognosis and mortality of ovarian cancer. Age-related factors can influence CA-125 levels, which may affect the interpretation of such examination results. By comparing CA-125 levels across different age groups, this study aims to provide a deeper understanding of the role of age in the variation of CA-125 levels and whether these differences influence the diagnosis or prognosis of advanced-stage epithelial ovarian cancer patients.

## 2. Material and methods

This study used a comparative analytic research method by looking for the relationship between CA-125 serum levels and age of age of epithelial ovarian cancer with advanced-stage patients treated in oncology clinic of Dr. Soetomo General Hospital Surabaya for January 1, 2021 – December 2022. The study was conducted retrospectively using secondary data obtained from patient medical records. The obtained data were analyzed using the Kruskal-Wallis test, with processing performed through the IBM SPSS software.

## 3. Results

Sixty-one patient samples were selected and met the inclusion and exclusion criteria. The characteristics of these patients are presented in Table 1.

**Table 1** Characteristics of epithelial ovarian cancer with advanced-stage patients treated in oncology clinic of Dr. Soetomo General Hospital Surabaya for January 1, 2021 – December 2022.

Age Group	Number (n)	Percentage (%)
<40 years	6	9.8
40-50 years	25	41
>50 years	30	49.2
Total	61	100

From the data on the characteristics of advanced-stage epithelial ovarian cancer patients at Dr. Soetomo General Hospital, Surabaya, from 2021 to 2022 in Table 1, it was found that there were 6 patients in the <40 age group, 25 patients in the 40-50 age group, and 30 patients in the >50 age group, with the largest number of patients found in the >50 age group.

### 3.1. Correlation between Serum CA-125 Levels and Patient Age

Data on the median serum CA-125 levels in patients and the bivariate analysis comparing CA-125 serum levels across the three age groups are presented in Table 2.

**Table 2** Comparison of serum CA-125 levels with patient age in epithelial ovarian cancer with advanced-stage patients treated in oncology clinic of Dr. Soetomo General Hospital Surabaya for January 1, 2021 – December 2022.

Variable	CA-125 Levels (U/mL)		P value
	Median (IQR)	Q1-Q3	
Age group <40 years	172.85	37.53 – 208.95	0.518
40-50 years	261	75.3 – 1369.7	
>50 years	116.2	57.72 – 1186.47	

Based on Table 2, the analysis of 61 patient samples shows that the median serum CA-125 level in the <40 age group was 172.85 U/mL (Q1: 38; Q3: 209), in the 40-50 age group was 261 U/mL (Q1: 75; Q3: 1370), and in the >50 age group was 116.2 U/mL (Q1: 58; Q3: 1186). The highest median CA-125 level was observed in the patient group aged 40-50 years. The Kruskal-Wallis test result (p value) was 0.518 (>0.05), which concludes that there was no significant difference between the three age groups

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#### 4. Discussion

In this study, the age groups were divided as follows: 6 patients in the <40 group, 25 patients in the 40-50 group, and 30 patients in the >50 group. The results show that the majority of ovarian cancer patients are above 40 years old, accounting for 90.6%. Similar research has also stated that ovarian cancer is most common in individuals over 40 years old [6]. Additionally, a study at RSUD Arifin Achmad found that most patients were in the middle-aged range (41-60 years) [7].

Above the age of 40, hormonal factors and aging-related risk factors increase. The aging process in women allows time for genetic changes in the ovarian surface epithelial cells [8]. It can be concluded that in this study, the incidence of ovarian cancer increases with the patient's age. A similar result was found in another study, which showed that the incidence of ovarian cancer increases with age, with the peak occurrence in the 41-50 age group. This study also indicated that as age increases, the risk of ovarian cancer rises due to degenerative factors, where bodily functions decline after the age of 45, thus increasing the likelihood of disease complications [9].

The analysis in this study shows that the median CA-125 levels for the <40 age group were 172.85 U/mL, for the 40-50 age group were 261 U/mL, and for the >50 age group were 116.2 U/mL. These results indicate a decrease in CA-125 levels in the >50 age group. This finding aligns with research that shows serum CA-125 levels in women aged  $\geq 55$  years are lower than those in women under 45 years. CA-125 levels naturally decline with age; women between 45 and 55 years show the most rapid decrease, with average serum CA-125 levels dropping by approximately 30% over a 10-year period [10].

The results suggest that age may have an influence on CA-125 levels. Factors such as a woman's age, age at menarche, age at menopause, and history of ovarian cysts are also linked to fluctuations in CA-125 levels. However, this study does not explain the underlying mechanisms by which age affects serum CA-125 levels, and further research is needed to investigate this correlation [5].

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#### 5. Conclusion

The results of this study showed that there was no significant difference of CA-125 serum levels between the three age groups of patients, so it can be concluded that there is no correlation between serum CA-125 levels and age in patients with advanced-stage epithelial ovarian cancer at Dr. Soetomo General Hospital, Surabaya. This study is limited as it only examines one variable without analyzing other factors that may have an impact, and further research with more variables is needed to obtain more valid results.

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#### Compliance with ethical standards

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##### *Disclosure of Conflict of interest*

No conflict of interest to be disclosed.

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