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Research Article

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Impact of Clinical Stage and Histological Type on Outcomes in Women with Ovarian Cancer at the Federal Medical Centre Abuja, North Central Nigeria

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ABSTRACT

Background: Ovarian cancer poses a significant global health challenge and ranks among the leading causes of gynaecological cancer-related mortality. Understanding the relationships among clinical stages, histological types, and outcomes is essential for optimising management strategies and enhancing patient prognosis.

Objectives: To determine the relationships between clinical stage, histological type, and their effects on survival outcomes in wo men diagnosed with ovarian cancer at the Federal Medical Centre Abuja.

Methods: This was a retrospective cohort study of all histologically diagnosed ovarian cancer in women treated at the FMC Abuja from 12th September 2021 to 11th September 2024. Relevant data were extracted from the centre's records and analysed using Epi InfoTM software. Descriptive statistics were used to summarize continuous variables; chi-square tests to compare categorical variables, and Kaplan–Meier analysis to estimate overall survival and progression-free survival rates. P-value ≤ 0.05 was considered significant.

Results: The incidence rate of ovarian cancer was 8.5%. The mean age was 46.8±13.8 years, with predominance of low parity (22; 59.5%). Most patients presented with FIGO stage I disease (13; 35.1%), followed by stage IV (11; 29.7%) and stage III (10; 27.0%). Advanced-stage disease (III-IV) accounted for 56.7% (21). Epithelial-cell carcinoma was the most prevalent histological type (26; 70.3%), with serous cystadenocarcinoma being the major subtype (20; 54.2%); it was predominantly high-grade (27; 73.0%). The three-year case fatality ratio was 29.7% (11), while the overall survival rate stood at 70.3% (26) and the progression-free survival rate at 35.1% (13). Significant associations were found with disease stage (p=0.007) and tumour grade (p=0.004), while histological type (p=0.181) and age-group (p=0.103) showed non-significant associations.

Conclusions: This study identified advanced-stage disease and high-grade serous carcinoma as significant predictors of poor outcomes in patients managed at FMC Abuja for ovarian cancer. This underscores the urgent need for enhanced screening, early detection, and comprehensive care strategies to improve patient outcomes.

Keywords: Ovarian Cancer, Histological Diagnoses, FIGO Stage, Survival Rate, FMC Abuja

Introduction

Ovarian cancer is the eighth most common cancer in women and one of the leading causes of cancer-related morbidity and mortality among women globally [1]. The 2022 global cancer statistics indicate that it is 18th in incidence and 14th in mortality of all cancers [2]. It is the most common cause of gynaecological cancer-related deaths, contributing 37.5% at Federal Medical Centre Abuja [3]. It is characterized by complex biology and heterogeneity and consists of various histological subtypes, each displaying distinct clinical behaviours, prognostic factors, and responses to treatment [4,5]. Epithelial ovarian cancer (EOC),

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which is the most common type (90-95%), comprises serous, mucinous, endometroid, clear cell, Brenner carcinoma and rare types [5]. The germ cell tumours comprising dysgerminomas, yolk sac tumours, immature teratomas and choriocarcinomas and the sex cord-stromal tumours comprising granulosa cells, Sertoli-Leydig cell tumours and fibromas constitute 5-10% of all ovarian cancers [6].

The risk of ovarian cancer increases with age, nulliparity or low parity, along with a family history of familial cancer syndrome and breast cancer susceptibility gene (BRCA) mutations [7]. Other risk factors include smoking, alcohol use, physical inactivity, obesity, diabetes, late age at menopause and hormone replacement therapy [8]. Understanding these risk factors is important in the development of prevention strategies.

The clinical outcomes of patients with ovarian cancer vary significantly according to the clinical stage at diagnosis and histological subtype. The International Federation of Gynaecology and Obstetrics (FIGO) staging system indicates that advanced disease (stage III-IV) is associated with poorer survival outcomes [9]. Additionally, those with high-grade serous ovarian carcinoma (HGSC) typically present with more aggressive disease and have poorer overall survival than those with low-grade serous carcinoma, which often has a more indolent course [10]. Research has shown that clear cell carcinomas, while rare, tend to be associated with poorer prognosis and resistance to standard chemotherapy [11]. Germ cell carcinomas and sex cord-stromal tumours have favourable prognoses [12]. Understanding these disparities can guide treatment decisions, allowing healthcare providers to tailor therapeutic approaches based on histological type.

In the context of treatment, the management of ovarian cancer has traditionally relied on a combination of surgery and chemotherapy, often with a platinum-based regimen [13]. However, the efficacy of such treatments can differ based on the histologic subtype. For example, low-grade serous tumours are generally less responsive to platinum-based therapies than high-grade tumours are, highlighting the importance of subtype-specific treatment paradigms [14].

Despite advances in treatment strategies, a significant proportion of ovarian cancer patients experience disease recurrence and progression. The identification of specific prognostic indicators associated with different histological types is crucial for improving patient outcomes. Research suggests that factors such as tumour grade, stage at diagnosis, presence of residual disease post-surgery, and specific molecular markers can provide valuable information regarding prognosis [15].

There are few studies on clinical outcomes, as they are related to the clinical stage and histologic variants of ovarian cancers in our environment. This study therefore aimed to determine the relationships between clinical stage and histological type and their influence on the outcomes of women diagnosed with ovarian cancer at the Federal Medical Centre Abuja.

Materials & Methods

This was a retrospective cross-sectional study that analyzed the clinical stage and histological types of ovarian cancer diagnosed and managed at the Federal Medical Centre Abuja over 3 years. FMC Abuja is one of the tertiary hospitals in the Federal Capital Territory that serves as a referral centre for private, cottage, general and specialist hospitals within the North Central Region of Nigeria. It is also an institution that employs a multidisciplinary and multimodal approach to cancer management in Nigeria. All patients who were managed for ovarian cancer from 12th September 2021 to 11th September 2024 and who had clinical staging and a histologic diagnosis were included. The clinical information, including age, parity, marital status, occupation, stage of cancer at diagnosis, histological type, treatment received and treatment response, was retrieved from the medical records of patients identified from the gynecological ward register and histopathology department. The outcomes measured were overall survival (OS) and progression-free survival (PFS). The data were imputed into Epi info TM version 7.2.6.0. 2023 software and analyzed [16]. Descriptive statistics (means, medians, and frequency percentages) were used to summaries demographic and clinical characteristics; chi-square tests were used to analyses the relationships between categorical variables (clinical stage, histological type and response to treatment); survival analysis was conducted via Kaplan–Meier analysis to estimate overall survival (OS) and progression-free survival (PFS) rates; and comparisons of different age groups, disease stages and histological types via the log-rank .test and multivariate Cox regression analysis were performed to assess potential risk factors influencing survival outcomes while controlling for confounding variables. P-value ≤ 0.05 is considered significant.

Results

From September 2021 to September 2024, there were 3,200 gynecological ward admissions, with 145 gynecological cancers managed. Among these, 37 patients were histologically diagnosed with ovarian cancer, constituting the study population. The incidence rate of ovarian cancer was 8.5% per year (95% CI: 4%-13%) among all gynecological cancers.

This study analyzed these patient's sociodemographic characteristics, disease stages, histological variants, clinical presentations, treatment modalities, and clinical outcomes.

Sociodemographic characteristics

The mean age of the study population was 46.8±13.8 years. Most cases (19; 51.4%) were diagnosed in women aged 40-59 years, indicating that this age group is more susceptible to ovarian cancer. The majority (22; 59.5%) had low parity (0-1), with a range of 0-10 and a median parity of 1. This aligns with the increased risk associated with incessant ovulation in women with low parity. Additionally, most patients had a tertiary level of education (26, 70.3%), were married (22; 59.5%), were of Hausa/Fulani ethnicity (11; 29.7%), were self-employed (25; 67.6%), had no family history of cancer (34; 91.9%), and were non-smokers. These characteristics are presented in Table 1 below.

Table 1: Sociodemographic characteristics of the study population

Variables	Frequency (n=145)	Percentage (%)
Age group (years)		
0-19	1	2.7
20-39	9	22.3
40-59	19	51.4
60-79	8	21.6
Parity		
0-1	22	59.5
2-5	11	29.7
6 and above	4	10,8
Education level		
Primary	1	2.7
Secondary	10	27.0
Tertiary	26	70.3
Occupation		
Civil servant	10	27.0
Student	2	5.4
Self employed	25	67.6
Marital status		
Single	11	29.7
Married	22	59.5
Widowed	4	10.8
Ethnic group		
Hausa/fulani	11	29.7
Igbo	9	24,3
Yoruba	4	10.8
Others (kaduna, efik, kanuri, tiv, edo, niger)	13	35.2
Family history of cancer		
Yes	3	8.1
No	34	91.9
Comorbidities		
Hypertension/diabetes	2	5.4
Hypertension	11	29.7
Diabetes	1	2.7
Others (HIV, peptic ulcer, thyroid cancer)	8	21.6
None	15	40.6

NB: The median age was 46 years, the mean age was 46.8±13.8 years, the median parity was 1, the mean parity was 2.2 ± 2.8. Frequency (N) and percentage (%) were used as statistical tools to summarize categorical data. Median and mean, used to effectively represent continuous variables.

Clinicopathological Characteristics and Treatment Modalities of the Study Population

The clinical presentations at diagnosis were non-specific, with all 37 patients experiencing abdominal pain and swelling. Additionally, some patients experienced bloating, weight loss, easy satiety, constipation, and irregular menstrual cycles. These findings highlight the need for increased awareness of these symptoms among healthcare providers.

Most patients (13; 35.1%) presented with early-stage I disease, followed closely by stage IV (11; 29.7%) and stage III (10; 27.0%) disease. Thus, patients with advanced stages III-IV disease comprised the majority (21; 56.7%).

The most common histological type was epithelial cell carcinoma (26; 70.3%), with the serous subtype accounting for the majority of cases (20; 54.2%). This was followed by germ-cell tumours (10; 27.0%), comprising dysgerminoma (4; 10.8%), immature teratoma (3; 8.1%), and mixed yolk sac/embryonal (3; 8.1%) tumours. The stromal cell tumours consisted of granulosa cells (1; 2.7%).

In terms of the histologic grade of the tumour, poorly differentiated tumours (high grade) were observed in the majority (27; 73.0%), and well-to-moderately differentiated tumors (low grade) were detected in 10 (27.0%) of the cases.

The treatment modalities revealed that all patients (37, 100%) underwent surgical procedures, with 11 (29.7%) having complete resection (R0), 8 (21.6%) having optimal debulking surgery with microscopic residuals (R1), and 18 (48.6%) having suboptimal debulking with macroscopic residuals (R2). Chemotherapy with platinum-based regimens was administered to 29 (78.4%) patients as neoadjuvant, adjuvant, or palliative chemotherapy.

Overall, 26 (70.3%) of the patients were still alive, with 13 (35.1%) attaining a disease-free state, 12 (32.4%) still receiving treatment, and 1 (2.7%) experiencing recurrence. These results are shown in Table 2.

Table 2: Clinicopathological features and treatment modalities of the study population

Characteristics	Number of cases (n)	Percentage (%)
Clinical Symptoms		
-Abdominal pain and swelling	37	100.0
- bloating	5	13.5
- irregular menstrual cycle	3	8.1
- weight loss	15	40.5
- easy satiety	10	27.9
- constipation	10	27.0
FIGO stage at presentation		
I	13	35.1
II	3	8.1
III	10	27.0
IV	11	29.7
Histological type		
Epithelial	26	70.3
- Serous	20	54.2
- Mucinous	2	5.4

- Endometroid	1	2.7
- Brenner	1	2.7
-Rare type	2	5.4
Germ cell tumour	7	27.0
- Dysgerminoma	4	10.8
-Immature teratoma	3	8.1
- Mixed type	3	8.1
Sex cord stromal tumour	1	2.7
-Granulosa	1	2.7
Tumour grade		
- poorly differentiated	27	73.0
- well to moderate	10	27.0
Treatment modalities		
-Palliative chemotherapy	6	16.2
- Surgery alone	8	21.6
- Surgery & chemotherapy	23	62.2
Surgical outcome		
Ro	11	29.7
R1	8	21.6
R2	18	48.6
Chemotherapy received		
- Neoadjuvant/adjuvant	2	5.4
- Adjuvant	17	46.0
- Palliative	11	29.7
- none	7	18.9
Outcome		
- Alive	26	70.3
- Dead	11	29.7
Survival duration		
<6 months	10	27.0
13-24months	16	43.2
25-36 months	3	8.1
Current status		
- deceased	11	29.7
- disease free	13	35.1
- recurrence	1	2.7
- under treatment	12	32.4

NB: The Chi-square test was used to determine the p-value. P-value ≤ 0.05 is considered significant: R0 = complete resection, R1 = optimal debulking surgery, R2 = suboptimal debulking surgery < = less than. Frequency (N) and percentage (%) were used as statistical tools to summarize categorical variables

Histological Variants and Clinical Correlation

The serous variants of the epithelial type were predominantly observed in the 40-59-year age group (13; 65.0%), whereas germ cell dysgerminomas were mostly observed in the 20-39-year age group (3; 75.0%). Hausa/Fulani ethnicity was associated with a higher proportion of serous subtypes (7; 35.0%).

Stage III-IV disease was more commonly observed in serous subtypes (13; 65.0%), whereas stage I disease was more commonly observed in dysgerminomas (3; 75.0%).

Poorly differentiated (high-grade) tumours were observed in all patients with immature teratomas, Brenner tumours, and granulosa cell carcinoma. Additionally, high-grade tumours were seen in 16 (80.0%) of serous tumours, 1 (66.7%) of mixed germ cell tumours, 1 (50.0%) of mucinous teratomas, and 1 (25.0%) of dysgerminoma patients.

Notably, Mortality was highest in the serous subtype (9; 45.0%), which may be related to the advanced stage at presentation and the high-grade nature of the disease. These findings are presented in Table 3 below.

Table 3: Histological variant and clinical correlation

Variables	Epithelial cell cancers					Germ cell tumours			Sex cord		
	Serous	Mucinous	Endometroid	Brenner	Rare type	Dysgerminoma	Immature teratoma	Mixed type	Granulosa	X^2	P
Age-group										31.28	0.15
	0-19	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	1(33.3)	0(0.0)	0(0.0)	
	20-39	2(10.0)	1(50.0)	1(100.0)	0(0.0)	0(0.0)	3(75.0)	1(33.3)	1(33.3)	0(0.0)	
	40-59	13(65.0)	0(0.0)	0(0.0)	0(0.0)	2(100.0)	1(25.0)	1(33.3)	1(33.3)	1 (100.0)	
	60-79	5(25.0)	1(50.0)	0(0.0)	1(100.0)	0(0.0)	0(0.0)	0(0.0)	1(33.3)	0(0.0)	
Ethnicity										17.42	0.83
Hausa/fulani	7(35.0)	0(0.0)	0(0.0)	0(0.0)	1 (50.0)	0(0.0)	1(33.3)	1(33.3)	1(100.0)		
Igbo	4(20.0)	1 (50.0)	0(0.0)	1(100.0)	1 (50.0)	1(25.0)	1(33.3)	0(0.0)	0(0.0)		
Youba	4(20.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)		
Others	5(25.0)	1 (50.0)	1(100.0)	0(0.0)	0(0.0)	3(75.0)	1(33.3)	2(66.7)	0(0.0)		
FIGO-Stage										26.9	0.31
I	6 (30.0)	1 (50.0)	1(100.0)	1(100.0)	0(0.0)	3 (75.0)	0(0.0)	1(33.3)	0(0.0)		
II	1 (5.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	1 (25.0)	0(0.0)	0(0.0)	1(100.0)		
III	5 (25.0)	1 (50.0)	0(0.0)	0(0.0)	1 (50.0)	0(0.0)	2 (66.7)	1(33.3)	0(0.0)		

IV	8 (40).0	0(0.0)	0(0.0)	0(0.0)	1 (50.0)	0(0.0)	1(33.3)	1(33.3)	0(0.0)		
Tumour Grade										14.23	0.07
High	16(80.0)	1(50.0)	0(0.0)	1(100.0)	2(100.0)	1(25.0)	3(100.0)	2(66.7)	1(100.0)		
Low	4(20.0)	1(50.0)	1(100.0)	0(0.0)	0(0.0)	3(75.0)	0(0.0)	1(33.3)	0(0.0)		
Outcome										6.39	0.60
Alive	11(55.0)	2(100.0)	1(100.0)	1(100.0)	2(100.0)	4(100.0)	2(66.7)	2(66.7)	1(100.0)		
Dead	9(45.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	1(33.3)	1(33.3)	0(0.0)		

NB: the data is represented as n (%): n = frequency, % = percentage, P- value < 0.05 is significant

Clinical Outcomes of the Study Population

During the 3-year study period, 11 out of the 37 cases managed died, with a case fatality ratio of 29.73% and an annual mortality rate of 9.91%. The clinical outcomes of the study population are presented in Table 4 below.

Overall Survival Analysis: The number of patients alive at 0-year, 1-year, 2-year and 3-year was analysed using Kaplan-Meier survival analysis. At the start of the study (0-year), all 37 patients were at risk and alive. At 1-year, nine patients had died, leaving 28 patients at risk, with a survival probability of 75.68% (28/37). At 2 years, one additional patient had died, leaving 27 patients at risk, with a survival probability of 72.97% (27/37). At 3 years, one more patient had died, leaving 26 patients at risk, with a survival probability of 70.27% (26/37). The median overall survival time was not reached, as more than half of the patients were still alive at the end of the study period.

Progression-Free Survival (PFS) Analysis: This analysis also evaluated the number of patients alive and disease-free at 0-year, 1-year, 2-year and 3-year. At the start of the study (0-year), all 37 patients were at risk. At 1-year, nine patients had died, leaving 28 patients at risk, with a PFS probability of 75.68% (28/37). At 2 years, eight patients had experienced events (1 death + 7 lost to follow-up or still receiving treatment), leaving 19 patients at risk, with a PFS probability of 48.65% (19/37). At 3 years, one patient had experienced recurrence, leaving 13 patients disease-free, with a PFS probability of 35.14% (13/37).

Table 4: Clinical outcome of the Study Population

Overall Survival (OS) Analysis			
Time (years)	**Number at Risk**	**Number of deaths**	**Survival probability**
0	37	0	1.0000
1	28	9	0.7568
2	27	1	0.7297
3	26	1	0.7027

Progression-Free Survival (PFS) Analysis			
Time (years)	**Number at Risk**	**Number of events**	**PFS probability**
0	37	0	1.0000
1	28	9	0.7568
2	19	8 (1 death + 7 lost to follow-up	0.4865
3	13	1 (recurrence)	0.3514

NB: The median survival time was not reached because more than half of the patients are still alive

The Kaplan-Meier test was used to estimate the survival function. Survival probability of 0.05 or below was considered significant. Overall survival analysis and progression-free survival were censored at 0-year, 1-year, 2-year, and 3-year events.

Prognostic Indices that Predict the Outcome of the Study Population

This study investigated the risk factors that predict outcomes in women with ovarian cancer. The clinical outcomes of patients with ovarian cancer were analysed based on age- group, stage at diagnosis, histologic type, and tumour grade, with results presented in Table 5 and Figures 1-4 (see supplementary file) using Kaplan-Meier survival analysis.

Age Group and Survival Among the Age Groups, the Survival Rates were as follows: 90.0% (9/10) for the 0-39 years age group, 57.9% (11/19) for the 40-59 years age group, and 75.0% (6/8) for the 60-79 years age group. The log-rank test results showed a significant difference in survival between the 0-39 and 40-59 age groups (p=0.042). However, overall, there was no significant association between age and survival (p= 0.103, Log Rank =0.309).

Stage at Diagnosis and Survival The stages at Diagnosis and Corresponding Survival Rates were as follows: stage I, 92.3% alive (12/13); stage II, 100% alive (3/3); stage III, 70% alive (7/10); and stage IV, 36.4% alive (4/11). The log-rank test results showed significant differences in survival among stages I vs. III, I vs. IV, II vs. IV, and III vs. IV. Overall, there was a significant association between disease stage and survival (p= 0.007, Log Rank <0.001).

Histologic Type and Survival: The overall survival (OS) rate for all histologic types was 70.3%. Patients with epithelial cell carcinoma (only serous) had an OS of 62.5%, whereas those with germ cell tumours (immature teratoma and mixed type) had an OS of 80.0%. The log-rank test results showed no significant differences in survival among histology types. Overall, there was no significant association between histological type and survival (p= 0.181, Log Rank=0.274).

Tumor Grade and Survival: All mortalities recorded were from high-grade poorly differentiated tumors. The log-rank test revealed a significant difference in survival between patients with high-grade tumors and those with low-grade tumors (p<0.001). Overall, there was a significant association between tumor grade and survival (p= 0.004, Log Rank = 0.015).

These results suggest that early-stage diagnosis (stage I-II) and low-grade tumors are associated with better survival outcomes, whereas late-stage diagnosis (stage III-IV) and high-grade poorly differentiated tumors are associated with poorer survival outcomes. Age group and histological type were not significantly associated with survival.

Table 5: Prognostic Indices based on age group, stage at diagnosis, histology and tumour grade

	Outcome		Survival probability	95%CI	X^2	DF	P
Variables	Alive n=26 (70.3%)	Dead n=11 (29.7%)					
Age-group(years)					4.55	2	0.103
0-39	9 (90.0)	1 (10.0)	0.900	0.715-1.000			
40-59	11 (57.9)	8 (42.1)	0.579	0.384-0.774			
60-79	6 (75.0)	2 (25.0)	0.750	0.476-1.000			
Stage at diagnosis					12.13	3	0.007
I	12 (92.3)	1 (7.7)	0.923	0.784-1.000			
II	3 (100.0)	0 (0.0)	1.000	1.000-1.000			
III	7 (70.0)	3 (30.0)	0.700	0.456-0.944			
IV	4 (36.4)	7 (63.6)	0.364	0.184-0.644			
Histology type					3.41	2	0.181
Epithelial cell	17 (65.4)	9 (34,6)	0.654	0.471-0.837			
Germ cell	8 (80.0)	2 (20.0)	0.800	0.588-1.000			
Sex cord stromal	1(100.0)	0(0.0)	1.000	1.000-1.000			
Tumour Grade					8.33	1	0.004
High	16(59.3)	11(40.7)	0.593	0.423-0.763			
Low	10(100.0)	0(0.0)	1.000	1.000-1.000			

NB: The data is represented as: n (%) n= frequency, % = percentage, 95% CI = 95% confidence interval, P- probability, X2 = Chi-square, DF = degree of freedom

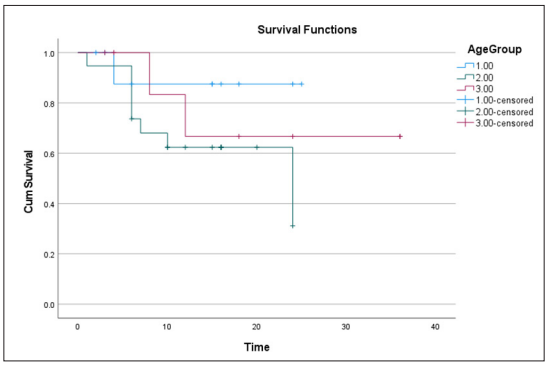

Figure 1: Test of the equality of survival distributions across different age groups

NB: Age-group 1 represents 0-39 years; age-group 2 represents 40-59 years and age-group 3 represents 60-79 years. For Age-group 0-39: N of events 1/10; means of survival (Estimate -22.375, standard error 2.455, 95% CI- 17.562-27.188); Age-group 40-59: N of events 8/19; means of survival (estimate -17.243, standard error 2.198, 95% CI- 12.952-21.534) and Age-group 60-79: N of events 1/10; means of survival (estimate -27.333, standard error 5.026, 95% CI- 17.483-37.184). Overall (Estimate -25.685, standard error 2.523, 95% CI- 20.740-30.630). Median (estimate- 24.000, standard error 10.219). Log Rank: chi-square = 2.346, df =2, p-value- 0.309. Log Rank between age-groups: 0–39 vs. 40–59 (0.042), 0–39 vs. 60–79 (0.1910) and 40–59 vs. 60–69 (0.563).

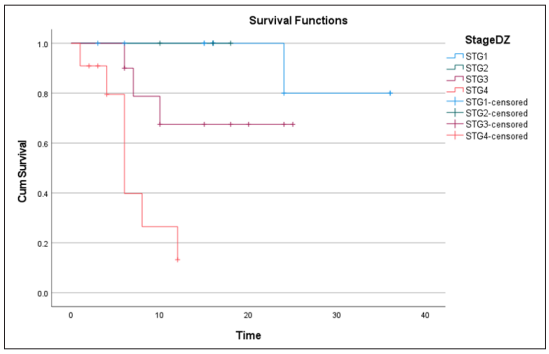

Figure 2: Test of equality of survival distribution for different stages of the disease

NB: Stage I: N of events 1/13; censored N =12, 92.3%; Stage II: N of events 0/3; censored N =3, 100.0%%; Stage III: N of events 3/10; censored N =7, 70.0%) and Stage IV: N of events 7/11;

censored N = 4, 36.4%. Overall, N of events 11/37, censored N =26, 70.3%. Log Rank: chi-square = 21.995, df =3, p-value-< 0.001

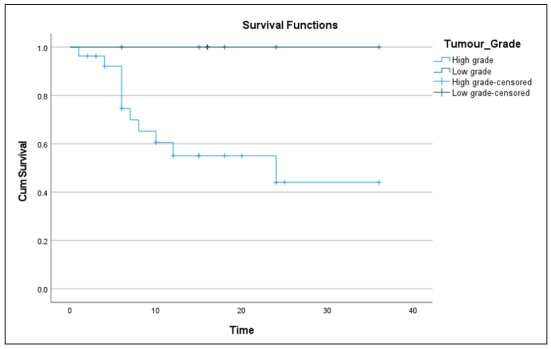

Figure 3: Test of equality of survival for tumour grade

NB: High-grade: N of events 11/27; censored N =16, 59.3%; Low-grade: N of events 0/10; censored N =10, 100.0%). Overall; N of events 11/37, censored N =26, 70.3%. Log Rank: chi-square = 5.907, df =1, p-value- 0.015

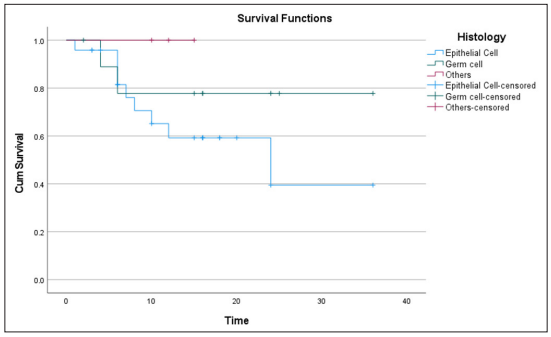

Figure 4: Test of equality of survival distribution for histologic types

NB: Epithelial: N of events 9/24; censored N =15, 62.5%; Germ Cell: N of events 2/10; censored N =8, 80.0% and Others: N of events 0/3; censored N =3, 100.0%). Overall, N of events 11/37, censored N =26, 70.3%. Log Rank: chi-square = 2.586, df =2, p-value- 0.274

Cox Multivariate Regression Analysis

The Cox multivariate regression analysis revealed several key findings. Notably, age group was not a significant predictor of survival (p=0.136). However, the analysis showed that germ cell tumours had a lower hazard ratio (HR 0.41, p=0.083) compared to epithelial cell tumours, indicating better survival outcomes for germ cell tumours.

Furthermore, advanced-stage tumours (stages III and IV) had significantly higher hazard ratios (HR 2.53, p=0.043 and HR 5.17, p<0.001, respectively) compared to stage I tumours. Additionally, high-grade tumours had a higher hazard ratio (HR 3.41, p=0.006) compared to low-grade tumours.

These findings, presented in Table 6, suggest that advanced stage (III and IV) and high-grade tumours are independent predictors of poor survival outcomes. In contrast, germ cell tumours are associated with better survival outcomes compared to epithelial cell tumours.

These findings indicate that advanced stage (III and IV) and high-grade tumours are independent predictors of poor survival. Germ cell tumours have better survival outcomes than epithelial cell tumours do.

Table 6: Cox multivariate regression analysis of the prognostic indices

Variable	Hazard ratio (HR)	95% CI	p value
Age	1.03	0.99-1.07	0.136
Histology (ref: Epithelial)			
Germ cell	0.41	0.15-1.13	0.083
Sex-cord stromal	0.00	0.00-inf	0.958
Stage (ref: I)			
II	0.93	0.21-4.09	0.923
III	2.53	1.03-6.23	0.043
IV	5.17	2.14-12.47	<0.001
Grade (ref: low)			
High	3.41	1.43-8.11	0.006

NB: ref- reference point. P-value < 0.05 is considered significant. The Likelihood ratio test was used to evaluate the overall fit of the Cox model

Discussion

This study investigated the influence of clinical stage and histological type of ovarian cancer on outcomes for women managed at the Federal Medical Centre in Abuja, Nigeria. We identified an annual incidence rate of 8.5% for new cases of ovarian cancer among women with gynaecological cancers. This rate is comparable to the 8.2% reported in Lagos, Southwest Nigeria, but higher than the 2.4% reported per year in Enugu, Southeast Nigeria, the 7.9% reported in Africa by the Global Cancer Observatory 2020, and the 6.6% reported worldwide in the Global Cancer Statistics 2022 [2,17-19]. Our incidence is lower than the 25.1% reported in the SEER study in the United States and the 16.5% reported in Afghanistan [20,21]. These variations in incidence rates reflect differences in population demographics, healthcare systems, and study methodologies, providing valuable insights into the global burden of ovarian cancer.

The aetiology of ovarian cancer remains largely unknown, although several associated risk factors were evaluated in our study. Advanced age is recognised as the most significant risk factor for developing ovarian cancer, particularly among women aged 40 years and older [7]. Our findings corroborate this assertion, as the majority of participants fell within the 40 to 59-year age range. This observation aligns with studies conducted in Nigeria, which found that ovarian cancer predominantly affects women in their 4th and 5th decades of life [17,18]. This age group has a majority of serous epithelial carcinoma subtypes, affirming a heightened risk of epithelial ovarian cancer with advancing age. Additionally, germ cell tumours occur mostly in adolescents and younger women, with 83% of cases occurring in those under the age of 40 years [22]. Our study affirms this trend regarding germ cell tumours in individuals younger than 40 years.

Nulliparity or low parity has also been linked to an increased risk of ovarian cancer due to incessant ovulation and associated complications [7,8,23]. This study is consistent with other studies that found a parity of 0-1 in the majority of participants. Other risk factors, such as family history and smoking, were not found to be significant in our study. These findings align with trends commonly observed in the literature, reinforcing the importance of implementing targeted screening and preventive measures in high-risk populations.

Ovarian cancer often presents with non-specific symptoms, which can lead to delays in diagnosis and management. In our study, abdominal pain and swelling were the most common symptoms reported along with weight changes, easy satiety, constipation, and irregular menstruation. These findings are in line with existing literature [7,17-21]. These nonspecific symptoms have contributed to late diagnoses and advanced-stage disease at presentation, highlighting the critical need for increased awareness and early ultrasound screening among at-risk groups.

The FIGO stage of ovarian cancer, essential for determining the extent of the disease and guiding treatment, was utilized in our study [9]. Our results indicated that stage I disease was the most common, followed by stage IV, stage III, and finally stage I. This finding aligns with the majority of stage I disease (58-64%) observed in a review article by Gaona-Luviano et al. [24]. The predominance of stage I disease may be attributed to improved health-seeking behaviours in Abuja, the capital of Nigeria. Our study's findings contrast with those from Enugu, Nigeria, by Iyoke et al. and the USA, by Torre et al., who reported stage III disease as the majority, with rates ranging between 64.0% to 51.0%, respectively [5,18].

Most studies in the literature report that advanced stage (III-IV) disease constitutes the majority of cases due to non-specific symptoms that mimic other gastrointestinal problems, leading to delays in diagnosis [17-21]. The high prevalence of advanced-stage disease in our study reinforces the necessity for targeted education and effective screening practices to facilitate early detection and improve access to healthcare.

Epithelial cell carcinoma was the most common histological type in our study, with serous cystadenocarcinoma being the predominant subtype. This serous subtype is less than the 75.0% reported in a study by Jelovac et al. but slightly higher than the 42.0% reported by Okunade et al. and 36.0% documented by Iyoke et al. [17,18,25]. Furthermore, serous carcinoma is typically diagnosed at more advanced stages, which aligns with our findings [24]. This predominance of serous carcinoma in the advanced stages underscores the urgent need for focused screening and intervention strategies for this variant.

Ovarian germ cell tumour, the second most common histological type, occurred in 27.0% of patients, with dysgerminoma as the most predominant variant. This value is greater than the 16% reported by Iyoke et al [18]. This may indicate differences in tumour epidemiology or biology. However, studies have indicated that germ cell tumours are usually diagnosed in early-stage disease, which is consistent with our study [20,22,24]. The percentage of stromal cell tumours, with granulosa cell carcinoma being the only variant in our study, was lower than that reported in the literature [6,17]. The geographic location, ethnic differences, sample size, and study design may have influenced this histological distribution.

Our study found that all patients underwent surgical staging procedures. Patients with incomplete resection or advanced disease received platinum-based chemotherapy regimens, administered as neoadjuvant, adjuvant, or palliative chemotherapy. This treatment approach is consistent with the 2021 National Comprehensive Cancer Network guidelines, which recommend surgery followed by chemotherapy for managing ovarian cancer [26]. Patients with stage IA and IB disease did not receive adjuvant chemotherapy after surgery, which aligns with existing research indicating that adjuvant chemotherapy does not provide additional benefits for patients with early-stage epithelial ovarian cancer [27].

In terms of clinical outcomes, our study revealed a case fatality ratio of 29.7% over three years. This rate is higher than the mortality rates of 8.7% in Africa and 15.5% in Abuja, but lower than the 52.9% reported in Asia [19,28]. The majority of these deaths were due to advanced stage III-IV disease (93.6%) at presentation and high tumour grade (40.7%). This underscores the need for increased awareness of symptomatology, effective screening tools, and prompt management.

Our study revealed an overall survival probability of 70.3% at three years. This rate is higher than the three-year survival rate of 60.6% reported by Howlader et al. in the SEER study [29]. This highlights the need for early detection and diagnosis, as well as prompt treatment and follow-up strategies, which are crucial for improving survival rates.

Furthermore, our study found advanced-stage disease at diagnosis and high-grade tumour to be predictors of poor prognosis for ovarian cancer. This is highlighted by the survival probabilities for stages I (92.3%), II (100.0%), III (70.0%), and IV (36.4%) at three years, with advanced-stage having a p-value <0.001 from Cox multivariate regression analyses. This finding is comparable to studies in the literature showing poor prognosis at advanced stages (5,17-24,27). Also, our study's finding of high-grade tumour (p=0.006) as a predictor of poor outcome aligns with findings in the literature [27,30].

The survival probability for age group and histological type were not statistically significant in our study, suggesting that these factors may not solely influence ovarian cancer prognosis. Although the age group did not significantly differ from the overall survival rate in our study, there was a significant difference in survival between the 0-39 years and 40-59 years age groups ($p = 0.042$). This finding is consistent with the SEER study, which revealed poorer survival with increasing age (76% at < 45 years and 30.9% at age 65 and older) [29]. Additionally, germ cell tumours were found to have a lower hazard ratio (HR 0.41, $p = 0.083$) compared to epithelial tumours in our study. This finding is comparable to another study that reported a five-year survival rate of 85.1% for germ cell tumours and 44.1% for epithelial tumours [30].

The limitations of this study include incomplete records due to its retrospective nature, a small sample size, a short follow-

up period, and limited generalizability due to the single-center study design.

Conclusions

This study provides valuable insights into the clinical stage and histological variants of ovarian cancer and their impact on clinical outcomes in Nigerian women. Our findings revealed that advanced-stage (III-IV) disease and high-grade serous carcinoma were predictors of poor prognosis for ovarian cancer. Despite a considerable proportion of patients experiencing favourable outcomes, as evidenced by a substantial overall survival rate, the significant case fatality ratio and relatively low progression-free survival observed within the three years highlights a critical challenge in the management of advance-stage and high-grade serous ovarian cancer. This underscores the urgent need for enhanced screening, early detection, and comprehensive care strategies to improve patient outcomes.

We, therefore, recommend the establishment of national guidelines for screening and management of ovarian cancer and improved access to comprehensive care, including surgery and chemotherapy. Also, public awareness and education on ovarian cancer symptoms and risk factors should be enhanced to facilitate early detection.

Disclosure

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Availability of the data: The authors will make the data available if needed.

Authors contribution

JOO wrote the research proposal and was major contributor to the manuscript writing.

CJO retrieved the data and contributed to the concept and manuscript writing

All authors read and approved the manuscript

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