Middle Eastern Cancer and Oncology Journal (MECOJ)
ISSN: 3080-1427 (online) / 3080-1419 (print)
Volume 1, Issue 4 (October 2025 – December 2025), pp: 26-31

Research Article

The Impact of Obesity on Survival in Iraqi Patients with Epithelial Ovarian Cancer

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Received: 30 April 2025 | Revised: 08 September 2025 | Accepted:12 November 2025 | Published: 25 December 2025

Abstract

Ovarian cancer is the leading cause of gynecological cancer death and is the fifth most common cause of cancer-related death. Ovarian neoplasms are comprised of several distinct histopathology entities, with epithelial ovarian cancer accounting for 90% of all cases of malignant tumors of ovarian origin. Despite the mounting health concerns associated with obesity and its reported correlation with elevated mortality from certain forms of cancer, the association between obesity and ovarian cancer remains less delineated. The objective of this study is to ascertain the impact of excess body weight on survival outcomes and clinicopathological features of EOC in Iraqi patients. A retrospective study of 112 EOC patients was conducted at the Oncology Teaching Hospital in Baghdad. The data collected encompassed a wide range of variables, including age, BMI, histopathology, tumor grade, FIGO stage, surgical debulking method, and survival time. Kaplan-Meier and log-rank tests were used for survival analysis.

Of the 112 patients included in the study, 50% were classified as overweight, 25% as obese, and 25% as having a normal BMI. Patients with obesity exhibited more advanced stages of the condition. The investigation revealed no substantial correlation between BMI and tumor grade, histopathology, or surgical outcomes. The median survival period was found to be 57 months in the normal weight group, 52 months in the overweight group, and 26 months in the obese group. P=0.15. Despite the absence of a statistically significant correlation between BMI and survival outcomes (p = 0.15), a clinically notable trend was observed, with obese patients demonstrating a reduced median survival duration. These findings suggest that while BMI alone may not be an independent prognostic factor, its potential clinical impact warrants further investigation in larger, adequately powered studies.

Keywords: *Epithelial Ovarian Cancer, Obesity, Survival, Body Mass Index, Iraq.*

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Cite This Article: Jawad, R. M., Aqabi, A. S., & Adnan, Z. (2025). The Impact of Obesity on Survival in Iraqi Patients with Epithelial Ovarian Cancer. *Middle Eastern Cancer and Oncology Journal*, *1*(4), 26-31. https://doi.org/10.61706/MECOJ160171

Introduction

Ovarian cancer is the most lethal of all gynecologic malignancies, responsible for high mortality rates worldwide. On a global scale, it ranks as the fifth most prevalent cause of cancer-related mortalities among women, exhibiting a five-year survival rate of approximately 46.5% (Cancer Statistics Review, 1975-2012 - Previous Version - SEER Cancer Statistics Review, n.d.; Malvezzi et al., 2016). In Iraq, ovarian cancer is the seventh most prevalent female cancer, with an incidence rate of 3.81 per 100,000 women, as reported by the Iraqi Cancer Registry (Al-Asadi, 2025). The most prevalent form of this disease, epithelial ovarian cancer (EOC), accounts for approximately 90% of cases and comprises diverse histopathological subtypes, including serous, mucinous, endometrioid, and clear cell carcinomas (Kurman et al., 2014). These neoplasms originate from the ovarian surface epithelium and share embryological origins with primary peritoneal carcinoma (Scully, 1999).

In its nascent stages, EOC frequently manifests with an asymptomatic profile, presenting instead with nonspecific symptoms such as abdominal distension, bloating, and urinary urgency (Abraham & Gulley, 2019; Goff et al., 2007). This clinical presentation often results in delayed diagnosis and a poor prognosis. A multitude of risk factors have been identified as contributing to the development of EOC, including age, family history, genetic predisposition—such as mutations in the BRCA1 and BRCA2 genes and Lynch syndrome—parity, hormonal factors, and lifestyle influences such as the consumption of high-fat diets and obesity (Satagopan et al., 2002; Shulman, 2010).

Obesity, defined as a BMI of ≥30 kg/m^2, has been identified as a significant global public health concern and a modifiable risk factor associated with an increased risk of various cancers, including endometrial, breast, and colorectal cancers (Calle et al., 2003; Phelps et al., 2024). The role of obesity in the development and prognosis of EOC remains a subject of controversy. The extant literature on the subject is inconclusive, with some studies reporting no significant impact of obesity on ovarian cancer survival (Matthews et al., 2009; Moysich et al., 2007), while others suggest poorer outcomes in obese patients (Pavelka et al., 2006).

Given the increasing global and regional prevalence of obesity, this study aims to comprehensively evaluate the effect of BMI on clinicopathological features and survival outcomes in patients with EOC. The findings of this study will contribute valuable insights into the development of personalized cancer care strategies. Recent systematic reviews and meta-analyses have sought to elucidate the role of obesity in ovarian cancer prognosis, yielding equivocal results. Aune et al. (2016) reported an association between higher BMI and increased ovarian cancer mortality. However, other pooled analyses suggest inconsistent survival effects depending on cancer subtype, stage, and treatment context. The discordant outcomes underscore the necessity for context-specific inquiries, particularly among underrepresented populations such as Iraqi women. The objective of this study is to evaluate the impact of BMI on survival rates and clinicopathological features in patients diagnosed with epithelial ovarian cancer in Iraq.

Methodology

The present study employed a retrospective cohort design to evaluate the impact of obesity on survival outcomes in patients diagnosed with epithelial ovarian cancer (EOC). The study was conducted at the Oncology Teaching Hospital in Baghdad, Iraq, a major referral center for oncology patients. The study period encompassed the timeframe from March 1, 2016, to December 31, 2020.

The study population comprised all female patients diagnosed with histologically confirmed EOC during 2016. The inclusion criteria encompassed patients with complete medical records who had received taxane and platinum-based chemotherapy and were available for follow-up. Exclusion criteria encompassed patients with non-epithelial tumor histology, borderline tumors, advanced-stage complications such as ascites or intestinal obstruction, incomplete chemotherapy, or missing essential data.

Patient data were obtained from the hospital registry and included demographic information (age), BMI at diagnosis, tumor histopathology and grade, FIGO stage, type of surgical debulking, and survival duration. The BMI was calculated as weight (kg) divided by height squared (meters squared). BMI categories were then determined according to the following classification system: normal weight (18.5–24.9 kg per meter squared), overweight (25–29.9 kg per meter squared), and obese (30 kg or more per meter squared). The BMI categories were maintained as distinct entities (normal, overweight, obese) in alignment with the standards established by the WHO. This approach was undertaken to investigate the potential for dose-response relationships to influence survival outcomes. While some studies opt to merge overweight and obese categories for the purpose of achieving greater statistical power, this study opted to retain separate groups in order to facilitate a more precise stratification of risk. This decision was informed by the observation that Iraq is experiencing an escalating obesity burden. The statistical analysis was conducted using SPSS version 23. Descriptive statistics were expressed as frequencies, means, and standard deviations. The analysis incorporated both one-way

analysis of variance (ANOVA) and chi-square tests to assess the correlation between BMI and clinicopathological variables. The analysis employed a combination of Kaplan-Meier survival analysis and log-rank test to assess the variation in survival across BMI categories. The statistical significance of the findings was determined by the p-value, with a threshold of $p \leq 0.05$ being considered significant.

The study was granted ethical approval by the Scientific and Ethical Committee of the Iraqi Board for Medical Specialization. Verbal consent was obtained from patients following detailed explanations of the study's aims and assurances of confidentiality.

Results

The present study was conducted on a cohort of 112 patients diagnosed with epithelial ovarian cancer (EOC), with the exclusion criteria meticulously applied to ensure the representativeness of the sample. The demographic and clinical characteristics of the study population are summarized in **Table 1**. Of the patients in this study, 50% (n=56) were classified as overweight, 25% (n=28) as obese, and 25% (n=28) as having a normal BMI. The mean BMI was 27.4 kg/m² (SD ± 3.5 kg/m²). Patients with obesity and overweight were more likely to present with advanced stages of the disease ($p < 0.0001$), as shown in **Table 2**. However, no significant association was found between BMI and patient age (p=0.198, tumor grade (p=0.108), or type of debulking surgery (p=0.165).

The Kaplan-Meier survival analysis indicated a median survival of 57 months for patients with a normal BMI, 52 months for patients with a BMI in the overweight range, and 26 months for patients with a BMI in the obese range (p=0.15). These findings are presented in **Table 3**. Although the survival difference did not reach statistical significance ($p = 0.15$), the observed decrease in median survival from 57 months (normal BMI) to 26 months (obese) suggests a clinically meaningful trend that merits further exploration, particularly in larger cohorts.

Table 1: Demographic and Clinical Characteristics

Variable	Value
Total number of patients	112
Age (mean ± SD)	53.1 ± 12.7 years
Age group distribution	
< 40 years	16.1%
40–59 years	46.4%
≥ 60 years	37.5%
BMI (mean ± SD)	27.4 ± 3.5 kg/m²
BMI categories	
Normal weight	25%
Overweight	50%
Obese	25%
Histopathology type	
Serous	55.4%
Mucinous	22.3%
Endometrioid	14.3%
Clear cell	8%
Grade	
G1	21.4%
G2	40.2%
G3	38.4%
Type of debulking surgery	
Optimal	43.7%
Suboptimal	56.3%

Table 2: Association of BMI with Clinicopathological Features

Feature	Normal BMI	Overweight	Obese	P value
Age <40 / 40-59 / ≥60	28.6% / 32.1% / 39.3%	14.3% / 50.0% / 35.7%	7.1% / 53.6% / 39.3%	0.198
Grade G1 / G2 / G3	32.1% / 42.9% / 25.0%	21.4% / 42.9% / 35.7%	10.7% / 32.1% / 57.2%	0.108
Stage I / II / III / IV	57.1% / 25% / 14.3% / 3.6%	16% / 25% / 41.1% / 17.9%	10.7% / 17.9% / 46.4% / 12.5%	<0.0001
Debulking (Optimal/Suboptimal)	57.1% / 42.9%	42.9% / 57.1%	32.1% / 67.9%	0.165

Table 3: Survival Analysis by BMI

BMI	Median Survival (months)	95% CI	P value
Normal	57	49.5–64.5	0.15
Overweight	52	49.2–54.7	
Obese	26	12.2–39.7	
Total	54	50.9–57	

Discussion

The present study examined the relationship between body mass index (BMI) and survival outcomes in Iraqi patients with epithelial ovarian cancer (EOC). Our findings align with the conclusions of several prior studies, which also found no statistically significant association between BMI and median survival (Matthews et al., 2009; Moysich et al., 2007). While overweight and obese patients were more likely to present with advanced-stage disease (FIGO III–IV), BMI demonstrated no statistically significant association with histopathological subtype, tumor grade, or completeness of debulking surgery. However, a substantial trend toward reduced survival in obese patients was observed. Specifically, the median survival period decreased by over 30 months between patients with normal weight and those with obesity. This finding may have clinical relevance despite not reaching statistical significance, likely due to the study's limited sample size (Bae et al., 2014; Protani et al., 2012). This finding indicates that while obesity may contribute to delayed presentation, it does not independently affect ovarian cancer prognosis when standard treatment protocols are applied. These findings imply that, while BMI does not function as an independent predictor in the present analysis, it may nevertheless exert a substantial influence on survival outcomes, potentially through indirect pathways such as treatment tolerance, comorbid conditions, or delayed diagnosis. It is imperative that future prospective studies be conducted with larger samples and comorbidity-adjusted models in order to elucidate this relationship.

In contrast to the findings of this study, some research has indicated a more unfavorable prognosis for obese patients (Bandera et al., 2017; Pavelka et al., 2006). These discrepancies may be attributable to variations in study design, patient populations, sample sizes, or confounding factors such as comorbidities. The present study's strengths include a well-defined cohort and comprehensive follow-up. However, the study's limitations include its retrospective design, relatively small sample size, and lack of data on comorbid conditions that might influence survival.

The elevated prevalence of advanced disease at presentation among obese patients in our cohort underscores the significance of implementing early detection strategies and awareness campaigns targeting at-risk populations. Moreover, the findings of this study lend support to the prevailing practices in which standard treatment protocols—including optimal cytoreductive surgery and full-dose taxane/platinum chemotherapy—remain unchanged based on BMI alone, in contrast to the recommendations outlined by international guidelines (e.g., ASCO, NCCN) (Wright et al., 2016).

While obesity has been associated with delayed diagnosis and higher disease burden, its impact on EOC prognosis requires further investigation. Large, prospective multicenter studies that incorporate comprehensive data on comorbidities and treatment adherence are necessary to further examine this relationship. Maintaining a healthy weight should be regarded as a pivotal public health concern, with implications for both cancer prevention and the promotion of overall health.

Limitations

The present study is not without its limitations. Firstly, the retrospective nature of the design may introduce selection and information biases, particularly with regard to the accuracy and completeness of the medical records. Secondly, the relatively small sample size may have constrained the statistical power to discern substantial disparities in survival outcomes across BMI categories. Thirdly, the absence of data regarding key confounding factors—such as comorbidities (e.g., diabetes, hypertension), treatment adherence, and performance status—restricts the ability to assess the independent effect of BMI on prognosis. Furthermore, the study was conducted at a single center in Iraq, which may limit the generalizability of findings to other populations. Future research should involve larger, multicenter prospective cohorts with comprehensive clinical data to better elucidate the relationship between obesity and survival in epithelial ovarian cancer.

Conclusion

The present study did not ascertain a statistically significant association between BMI and survival outcomes in Iraqi patients with epithelial ovarian cancer (EOC). However, the substantial reduction in survival observed among obese patients underscores a clinically relevant trend. These findings underscore the importance of timely diagnosis and adherence to standard-of-care treatments, including full-dose chemotherapy and optimal surgery, regardless of BMI. It is imperative that further research be conducted with larger, prospective cohorts in order to confirm these observations and provide the necessary guidance for clinical decision-making.

Declarations

Ethics approval and consent to participate

This study was reviewed and approved by the Scientific and Ethical Committee of the Iraqi Board for Medical Specialization. Institutional permission was also obtained from the Oncology Teaching Hospital prior to data collection.

All procedures were conducted in accordance with the ethical standards of the institutional research committee and the principles of the Declaration of Helsinki. Verbal informed consent was obtained from

all participants after providing a full explanation of the study objectives. Confidentiality of patient information was strictly maintained, and all collected data were used solely for research purposes.

Consent for Publication

Not applicable.

Availability of Data and Material

The data that supports the findings of this study are available from the corresponding author upon reasonable request.

Conflicts of Interest / Competing Interests

The authors declare that there are no conflicts of interest.

Funding

The authors declare that this research received no external funding.

Author Contributions

R.M.J: Conceptualization, Methodology, Validation, Formal analysis, Investigation, Resources, Data curation, Visualization, Writing of the original draft, Supervision.

A.S.A: Writing – review & editing.

Z.A: Resources, Data curation, Writing of the original draft, Writing – review & editing, Visualization, Supervision.

Acknowledgment

Not applicable

Use of Generative AI and AI-Assisted Technologies

The authors declare that no generative AI or AI-assisted technologies were used in the preparation of this work.

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