

Research Article

Body Mass Index and Risk of Post-Treatment Relapse in Endometrial Cancer: Evidence from an Iraqi Cross-Sectional Cohort

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Abstract

Obesity has been identified as a contributing factor to the development and outcomes of endometrial cancer (EC), yet its role in post-treatment relapse remains to be elucidated. The objective of this study is to examine the association between body mass index (BMI) and the incidence of relapse among Iraqi women diagnosed with endometrial cancer (EC). A cross-sectional study was conducted at the Oncology Teaching Hospital, Baghdad Medical City (January–October 2021). A total of 75 women with histologically confirmed EC were categorized by BMI (normal weight, overweight, obese) according to the WHO criteria. Relapse was ascertained during routine follow-up and compared across BMI categories using chi-square testing. The discriminatory performance of continuous BMI was assessed using receiver operating characteristic (ROC) analysis. The results indicated that relapse occurred in 24% of normal-weight patients, 32% of overweight patients, and 60% of obese patients ($\chi^2 = 7.17$; $p = 0.027$). The BMI exhibited moderate discriminatory capability for relapse (AUC=0.638; 95% CI 0.505–0.771; $p=0.045$), with an optimal threshold of 26.9 kg/m² (sensitivity 72%, specificity 48%). A higher BMI has been demonstrated to be associated with an increased risk of relapse following EC treatment. Given its modest discriminatory performance, BMI should not be considered a stand-alone prognostic marker. However, it may provide supportive information in low-resource settings. The validation of these findings in larger, multivariable studies is warranted.

Keywords: Endometrial Cancer; Obesity; Body Mass Index; Relapse; Prognostic Marker.

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Introduction

Endometrial cancer (EC) is the most frequently diagnosed gynecologic malignancy in many high-income settings, and its incidence has risen in parallel with the global obesity epidemic (Endometrial Cancer Report | World Cancer Research Fund, n.d.; Makker et al., 2021). A substantial corpus of epidemiological research suggests a positive correlation between excess adiposity and the risk of developing EC, with the potential to adversely impact outcomes following a diagnosis (Calle et al., 2003; Harvey et al., 2023; Renehan et al., 2008). Research indicates that in certain demographics, more than half of the EC cases are attributable to overweight or obesity, emphasizing the clinical significance of adiposity across the disease continuum (Koliaki et al., 2023; Renehan et al., 2008).

A multitude of biological pathways likely underpin the connection between obesity and the severity of endometrial cancer (EC), including insulin resistance and hyperinsulinemia, augmented peripheral aromatization of androgens to estrogens within adipose tissue, and chronic low-grade inflammation that fosters tumor growth and progression (Allott & Hursting, 2015; Onstad et al., 2016; Perry & Shulman, 2020). Despite the extensive global research conducted on the subject, there is a paucity of studies that have examined obesity-related relapse outcomes in Middle Eastern populations. This study addresses this gap by examining BMI and relapse among Iraqi women with endometrial cancer, thereby contributing context-specific insights.

Despite the well-established role of obesity as an etiological factor, its prognostic value for post-treatment relapse has received comparatively less attention in the research literature (Ladas et al., 2025; Marin et al., 2024; Simancas-Racines et al., 2025). In light of Iraq's escalating prevalence of obesity and the necessity for context-specific evidence, this study aimed to assess the association between BMI and relapse in an Iraqi EC cohort. To this end, an evaluation of BMI's predictive performance was conducted using ROC analysis. This study offers region-specific evidence from Iraq, where obesity prevalence is rising while knowledge about its implications for cancer survivorship is limited. By directing attention to an Iraqi cohort, this work contributes to addressing a regional evidence gap in the obesity–cancer outcome literature.

Methodology

Study design and setting: A cross-sectional analysis was conducted at the Oncology Teaching Hospital, Baghdad Medical City, from January 1 to October 31, 2021 (Karataşlı et al., 2021).

Participants: Patients who met the inclusion criteria were adults (aged ≥ 18 years) with histopathologically confirmed EC who provided informed consent and were available for follow-up. Exclusion criteria included subjects who were under the age of 18, had a second primary malignancy, or were lost to follow-up.

Ethics: The protocol in question received the requisite approval from the Iraqi Council of Medical Specialization. In accordance with the utilization of routinely collected clinical data, the informed consent procedures adhered to the institutional policy.

Data Collection: The demographic and clinical variables encompassed BMI, stage, histologic subtype, and treatment response. The BMI categories were determined using the World Health Organization (WHO) definitions: normal weight, overweight, and obese.

Statistical analysis: The statistical significance of the observed associations between BMI category and relapse was determined by means of the chi-square test. The prognostic discrimination of continuous BMI for relapse was quantified by ROC analysis. The analyses were conducted using IBM SPSS version 25.0, and statistical significance was set at $p < 0.05$.

Results

The present study sought to ascertain the association between BMI category and relapse (**Table 1**). The sample population was comprised of 75 participants, with each BMI category (normal weight, overweight, obese) including 25 patients. Relapse was observed in 6 of 25 patients with a normal body mass index (24%), 8 of 25 patients with a body mass index in the overweight category (32%), and 15 of 25 patients with a body mass index in the obese category (60%). The analysis revealed significant group differences ($\chi^2 = 7.17$; $p = 0.027$), indicating a positive association between higher BMI and relapse.

Predictive performance of BMI: The ROC curve for continuous BMI yielded an area under the curve (AUC) of 0.638 (95% confidence interval [CI] 0.505–0.771; $p=0.045$). An optimal threshold of 26.9 kg/m² demonstrated 72% sensitivity and 48% specificity for identifying relapse (Table 2).

Discussion

In this single-center Iraqi cohort, a higher BMI was associated with a greater likelihood of relapse following EC treatment. Patients categorized as obese demonstrated a relapse rate that was more than double the rate observed in patients of normal weight. The overall association across BMI categories achieved statistical significance ($p=0.027$). These results align with prior research reporting inferior outcomes among women with obesity and EC, potentially mediated by endocrine and inflammatory pathways (Allott & Hursting, 2015; Burkett et al., 2023; Calle et al., 2003; Deng et al., 2010; Donkers et al., 2021; Mihm et al., 2011; Reeves et al., 2007). The relapse rates observed in this Iraqi cohort (24% in normal weight, 32% in overweight, and 60% in obese patients) appear higher than those reported in some Western cohorts. However, methodological and population differences may partly explain this variation. Comparative studies from Europe and North America, for example, have reported relapse rates depending on BMI category. These contextual

differences underscore the necessity for region-specific survivorship strategies.

Beyond the realm of categorical comparisons, BMI, when considered as a continuous measure, exhibited only marginal discriminatory capacity, as evidenced by the area under the curve (AUC) value of 0.638. Consequently, the use of BMI as a standalone prognostic tool is questionable. Rather, it may be employed in conjunction with clinicopathologic characteristics to enhance risk stratification in routine clinical practice, particularly in settings where resources are limited (Arem & Irwin, 2013; Lewin et al., 2010; Li et al., 2023; Onstad et al., 2016).

The presence of disparities in obesity patterns and care pathways at the population level may be a contributing factor to the observed heterogeneity across international studies. The findings of this study support the incorporation of weight assessment and counseling into survivorship care plans in Iraq and analogous settings, in conjunction with evidence-based lifestyle interventions (Clark et al., 2016; Von Gruenigen et al., 2008). While the findings support the incorporation of routine weight assessment and structured lifestyle counseling in survivorship care, it is essential to emphasize that these recommendations should be presented as general health benefits rather than as validated relapse risk stratification strategies, given the modest prognostic performance of BMI alone.

Table 1. Relapsed by BMI Category

BMI Category	Patients (n)	Relapsed (n)	Relapse Rate (%)	p-value (χ^2)
Normal weight	25	6	24	0.027
Overweight	25	8	32	
Obese	25	15	60	

Table 2. ROC Metrics for BMI as a Predictor of Relapse

AUC	95% CI	p-value	Optimal cut-off; Sensitivity; Specificity
0.638	0.505–0.771	0.045	26.9 kg/m ² ; 72%; 48%

Recommendations

It is imperative to incorporate routine weight assessment and structured lifestyle counseling into the follow-up care of individuals who have survived EC. It is imperative to consider BMI as a component of relapse risk models while pursuing validation with larger, multi-center cohorts. While BMI may be considered as part of exploratory relapse risk assessment, its utility requires validation in larger, multi-center cohorts with multivariable modeling. It is imperative to acknowledge that these findings are regarded as preliminary and hypothesis-generating, underscoring the necessity for longitudinal studies to confirm observed associations and elucidate the underlying causality.

Conclusion

In this Iraqi cohort, elevated BMI has been demonstrated to be associated with an increased risk of relapse following EC treatment. Despite its modest predictive capacity, BMI emerges as a readily accessible indicator that can synergize with clinicopathologic factors to inform risk-adapted follow-up strategies.

Declarations

Ethics approval and consent to participate

The protocol in question received the requisite approval from the Iraqi Council of Medical Specialization. In accordance with the utilization of routinely collected clinical data, the informed consent procedures adhered to the institutional policy.

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.

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Authors' Contributions

Z.M.A: Methodology, Formal analysis, Writing of the original draft.

A.M.A: Writing – review & editing, Supervision.

A.S.A: Writing – review & editing, Supervision.

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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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