

Research Article

Association of Obesity, Diabetes, Hypertension with Endometrial Cancer

Naba¹, Hira^{2*}, Nosheen³, Ayesha⁴, Bakhtawar⁵, Sohaib⁶

¹Registrar, Department of Obstetrics and Gynaecology, Akbar Niazi Teaching Hospital, Islamabad, Pakistan.

^{2*}Junior Consultant, Department of Obstetrics and Gynaecology, Javeed Medical Hospital, Peshawar, Pakistan.

³Trainee Medical Officer, Department of Obstetrics and Gynaecology, Hayatabad Medical Complex, Peshawar, Pakistan.

⁴Medical Officer, Department of Obstetrics and Gynaecology, Molvi G Hospital, Peshawar, Pakistan.

⁵Medical Officer, Department of Obstetrics and Gynaecology, Kohat Medical Center, Kohat, Pakistan.

⁶Medical Officer, Department of General Medicine, Khushkhal Medical Center, Peshawar Pakistan.

Corresponding Author: Hira

Junior Consultant, Department of Obstetrics and Gynaecology, Javeed Medical Hospital, Peshawar, Pakistan.

Email: hirahassan502@gmail.com

Received: 25.02.2026, Revised: 16.05.2026, Accepted: 25.05.2026

ABSTRACT

Background: Endometrial cancer is a common type of gynecologic cancer in women, especially those after menopause. Important risk factors have been reported to be several metabolic conditions such as obesity, diabetes mellitus and hypertension. These disorders can affect the risk of endometrial cancer by hormone-related mechanisms, insulin resistance, chronic inflammation and disrupted metabolism.

Objective: To determine the association of obesity, diabetes mellitus, and hypertension with endometrial cancer among women presenting at Akbar Niazi Teaching Hospital, Islamabad.

Methods: This descriptive cross sectional analytical study was done at Akbar Niazi Teaching Hospital, Islamabad between the period of January 2025 to June 2025. A total of 75 women, who had histopathologically confirmed endometrial cancer, were included. The following clinical data were obtained that included age, menopausal status, parity, presenting symptoms, body mass index, diabetes mellitus, and hypertension. Age, menopausal status, parity, presenting symptoms, body mass index, diabetes mellitus, and hypertension were obtained. Body mass index was used to determine obesity, and medical history, previous diagnosis and hospital records were used to determine diabetes and hypertension. The SPSS version 26 software was used for data analysis. The categorical variables were presented as frequencies and percentages, and the quantitative variables were presented as means and standard deviations. Test chi-square and logistic regression analysis were used when appropriate. P value < 0.05 was deemed statistically significant.

Results: The mean age of the patients was 54.8 ± 9.6 years. Most patients were postmenopausal 54 (72.0%), and postmenopausal bleeding was the most common presenting complaint 43 (57.3%). Obesity was present in 46 (61.3%) patients, diabetes mellitus in 39 (52.0%), and hypertension in 42 (56.0%). All three metabolic risk factors were present together in 24 (32.0%) patients. Obesity, diabetes mellitus, and hypertension showed significant association with high-grade endometrial cancer, with p-values of 0.031, 0.018, and 0.026, respectively. The combined presence of all three risk factors showed the strongest association with high-grade disease (p=0.011).

Conclusion: Obesity, diabetes mellitus, and hypertension were frequently observed among women with endometrial cancer. These metabolic conditions were significantly associated with high-grade tumors, especially when present together. Early identification and control of metabolic risk factors may help in risk reduction, timely diagnosis, and improved clinical outcomes in women at risk of endometrial cancer.

Keywords: Endometrial Cancer, Obesity, Diabetes Mellitus, Hypertension, Metabolic Syndrome, Postmenopausal Bleeding.

INTRODUCTION

Endometrial cancer represents an important malignancy of the female genital tract, and is

especially common among women in the perimenopausal and post-menopausal age groups. Commonly occurs from the lining of the uterus

and commonly is associated with irregular or post-menopausal periods. Since bleeding after menopause is an early warning sign, it is helpful to evaluate it earlier and manage it better. But sometimes, symptoms may be overlooked or women may not have easy access to gynecological healthcare, resulting in a delayed presentation [1-3].

Several hormonal, reproductive, genetic and metabolic factors play a role in development of endometrial cancer. Of these, obesity has emerged as a major concern as excess fat can affect the metabolism of estrogen. Adipose tissue turns into a significant source of estrogen in postmenopausal women. Endometrial exposure to estrogen without a sufficient effect of progesterone can cause proliferation, hyperplasia, and possible a malignant transformation of the endometrium over time. Obesity is also linked to chronic inflammation and insulin resistance, which are the two other risk factors that could be linked to cancer [4-6]. Another significant metabolic disorder linked to EC is diabetes mellitus. Insulin and the insulin-like growth factors may help stimulate abnormal cell growth, leading to hyperinsulinemia and insulin resistance. Women with diabetes may have obesity, dyslipidemia, and other metabolic abnormalities that can all play a role in endometrial carcinogenesis. The relationship between tumor histology and poor glycemic control may also suggest that poor glycemic control is associated with more aggressive disease patterns [7, 8].

HBP is commonly seen in EC patients, and sometimes included in a metabolic risk profile. While hypertension may not directly lead to endometrial malignancy, its association with obesity and diabetes is indicative of the presence of metabolic syndrome. These changes can lead to an increase in systemic inflammation, vascular dysfunction and hormonal imbalance. So, hypertension is an appropriate measure to assess when examining risk factors for endometrial cancer, in addition to obesity and diabetes [9, 10].

Many women with endometrial cancer have more than one metabolic risk factor in the setting of clinical practice. The association between obesity, diabetes mellitus and hypertension might be more closely linked to the development of tumors and the severity of the tumor than any of these factors individually. Recognizing these connections is critical since these are potentially modifiable with lifestyle modification, weight management, dietary

changes, exercise, and medical management [11].

Limited local data are available regarding the association of obesity, diabetes mellitus, and hypertension with endometrial cancer in Pakistani women. Local evidence is important because lifestyle patterns, health-seeking behavior, reproductive factors, and metabolic disease burden may differ across populations. Therefore, the present study was conducted at Akbar Niazi Teaching Hospital, Islamabad, to determine the association of obesity, diabetes mellitus, and hypertension with endometrial cancer and to assess their relationship with tumor characteristics among affected women.

METHODOLOGY

This descriptive cross-sectional analytical study was conducted at Akbar Niazi Teaching Hospital, Islamabad, from January 2025 to June 2025. The study was designed to evaluate the association of obesity, diabetes mellitus, and hypertension with endometrial cancer among women presenting to the gynecology and oncology departments. A total of 75 women diagnosed with endometrial cancer were included in the study during the defined study period.

All women with histopathologically confirmed endometrial cancer were enrolled after fulfilling the selection criteria. Reproductive age group, perimenopausal and postmenopausal patients were included. Women who had incomplete medical records, previous history of other gynecological malignancy, recurrent endometrial cancer or previously received chemotherapy/radiotherapy (before full baseline assessment) were excluded from the study. These criteria were established to ensure only newly diagnosed and well-documented cases for analysis.

The data were gathered by applying the structured proforma. Data collected included age, marital status, parity, menopausal status, symptoms, and history if applicable. Metabolic risks factors, such as obesity, diabetes mellitus, and hypertension were specially considered. Body weight and height were measured and BMI was estimated by dividing body weight (kg) by height squared (m^2). Patients' BMI classified them as normal weight, overweight, or obese. Body mass index of $30 \text{ kg}/m^2$ or higher was deemed to indicate obesity.

The diagnosis of diabetes mellitus was based on a previous physician diagnosis, use of antidiabetic medication or documented elevated fasting blood glucose and/or HbA1c in

the hospital record. Hypertension was based on a previously diagnosed disease, use of antihypertensive drugs, or an increased blood pressure on clinical examination performed at the time of evaluation. Where available, the length of time that diabetes and hypertension had been present were also recorded. Patients with more than one metabolic disorder were then sub-stratified for the combined effect of obesity, diabetes and hypertension.

Clinical presentation was determined by recording of symptomology including the presence of postmenopausal bleeding, abnormal uterine bleeding, pelvic pain and vaginal discharge. Review of relevant investigations: complete blood count (CBC), pelvic ultrasound findings and endometrial thickness. Histopathological diagnosis was verified by biopsy or surgical specimen diagnosis. Histological type, tumor grade, depth of myometrial invasion and lymphovascular invasion (where available) were tumor-related variables considered.

The data collected were entered and analyzed in the SPSS version 26. Continuous variables

like age, BMI, and endometrial thickness were described as mean and SD. Qualitative variables like menopausal status, obesity, diabetes mellitus, hypertension, tumour grade and histological type were presented as frequencies and percentages. The association between obesity, diabetes mellitus and hypertension with the grade of tumors and other clinicopathological parameters were evaluated using chi-square test. Logistic regression was performed to identify the predictive value of metabolic risk factors for HEC. The p value of < 0.05 was considered as statistically significant.

RESULTS

A total of 75 women were included in the study. The mean age of the subjects was 54.8 ± 9.6 years and the highest percentage of patients were in the age range of 50–59 years. The majority of patients were post-menopausal and the most common presenting complaint was post-menopausal bleeding. Among women with endometrial cancer, obesity, diabetes mellitus and hypertension were common.

Table 1. Baseline Demographic and Clinical Characteristics of Study Participants

Variable	Frequency n	Percentage %
Age group		
<40 years	6	8.0
40–49 years	16	21.3
50–59 years	31	41.3
≥60 years	22	29.4
Menopausal status		
Premenopausal	21	28.0
Postmenopausal	54	72.0
Parity		
Nulliparous	12	16.0
1–2 children	26	34.7
≥3 children	37	49.3
Presenting complaint		
Postmenopausal bleeding	43	57.3
Abnormal uterine bleeding	22	29.3
Pelvic pain	6	8.0
Vaginal discharge	4	5.4

Most of the women were between 50 and above years old. Postmenopausal women were more numerous, which indicated that endometrial malignancy occurred more often after

menopause. The most common clinical presentation was post-menopausal bleeding, and for perimenopausal and premenopausal women, abnormal uterine bleeding.

Table 2. Distribution of Obesity, Diabetes, and Hypertension among Study Participants

Risk factor	Frequency n	Percentage %
Obesity	46	61.3

Diabetes mellitus	39	52.0
Hypertension	42	56.0
Both diabetes and hypertension	28	37.3
Obesity with diabetes	31	41.3
Obesity with hypertension	34	45.3
Obesity, diabetes, and hypertension together	24	32.0

The most common metabolic risk factor was obesity observed in 46 (61.3%) patients. The diagnosis of diabetes mellitus was made in 39 (52.0%) and hypertension in 42 (56.0%)

patients. Many patients had 2 or more metabolic risk factors. The two risk factors of obesity, diabetes and hypertension were present in 24 patients (32.0%).

Table 3. Body Mass Index Categories among Patients with Endometrial Cancer

BMI category	Frequency n	Percentage %
Normal weight	12	16.0
Overweight	17	22.7
Obese class I	25	33.3
Obese class II	14	18.7
Obese class III	7	9.3

Of patients, only 12 (16.0%) had a normal BMI in relation to BMI index. Over 60% of the participants were overweight or obese. The BMI class I and II obese were most frequent

classes. Overall, 61.3% of patients were obese, and there was a high burden of excess weight for women with endometrial cancer.

Table 4. Association of Obesity, Diabetes, and Hypertension with Tumor Grade

Risk factor	Low-grade tumor n=47	High-grade tumor n=28	p-value
Obesity present	24	22	0.031
Diabetes mellitus present	19	20	0.018
Hypertension present	21	21	0.026
All three risk factors present	10	14	0.011

There was a statistically significant association between metabolic risk factors and tumor grade. The incidence of obesity was higher in patients with high-grade tumors than low-grade tumors, $p=0.031$. High-grade disease

was also significantly associated with diabetes mellitus and hypertension (p values of 0.018 and 0.026, respectively). A higher association was found for all three risk factors with high grade endometrial cancer ($p=0.011$).

Table 5. Histopathological Characteristics of Endometrial Cancer Cases

Histopathological variable	Frequency n	Percentage %
Histological type		
Endometrioid carcinoma	56	74.7
Serous carcinoma	9	12.0
Clear cell carcinoma	5	6.7
Mixed type carcinoma	5	6.6
Tumor grade		
Grade I	28	37.3
Grade II	19	25.4
Grade III	28	37.3
Myometrial invasion		
<50% invasion	43	57.3
≥50% invasion	32	42.7
Lymphovascular invasion		

Present	18	24.0
Absent	57	76.0

The most frequent histological type was endometrioid carcinoma, seen in 56 patients (74.7%). The number of pupils with Grade I or III tumours was equal at 28 (37.3%). In most

cases myometrial invasion was less than 50% and in 18 patients (24.0%) the involvement of the lymphovascular spaces was present.

Table 6. Logistic Regression Analysis for Predictors of High-Grade Endometrial Cancer

Predictor variable	Odds ratio OR	95% CI	p-value
Obesity	2.41	1.08–5.39	0.032
Diabetes mellitus	2.86	1.20–6.81	0.018
Hypertension	2.52	1.10–5.78	0.029
Combined obesity, diabetes, and hypertension	3.94	1.42–10.88	0.008
Postmenopausal status	2.18	0.82–5.78	0.116

Logistic regression analysis showed that obesity, diabetes mellitus and hypertension were significant risk factors for high-grade endometrial cancers. Patients with obesity had 2.41 times higher odds of having high-grade disease. There was a 2.86 times greater risk associated with diabetes mellitus and 2.52 times greater risk associated with hypertension. Patients with all three metabolic risk factors had the most significant odds of developing HEC (3.94 times greater than patients with no

metabolic risk factors). In general, the results indicate that overweight/obesity, diabetes mellitus and hypertension frequently occurred in people with endometrial cancer. Additionally, these factors were noted to be significant with increased tumor grade suggesting metabolic disorders may be correlated not only with an increased risk of developing endometrial cancer, but also with more aggressive clinicopathological characteristics.

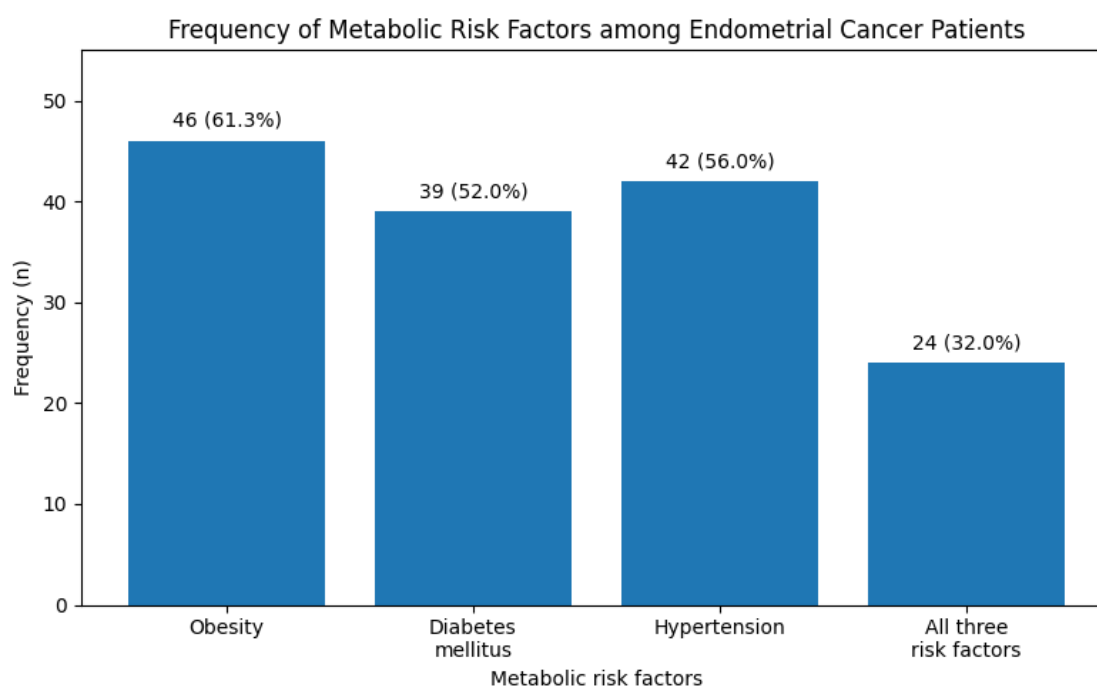


Figure 1. Frequency of Obesity, Diabetes Mellitus, Hypertension, and Combined Metabolic Risk Factors among Patients with Endometrial Cancer.

DISCUSSION

The present study evaluated the association of obesity, diabetes mellitus, and hypertension with endometrial cancer among 75 women at

Akbar Niazi Teaching Hospital, Islamabad. The findings showed that metabolic risk factors were common in patients with endometrial cancer. Obesity was present in 61.3% of

patients, diabetes mellitus in 52.0%, and hypertension in 56.0%. Moreover, 32.0% of patients had all three risk factors together. These findings indicate that endometrial cancer in this study population was frequently associated with a background of metabolic disturbance [12, 13].

In the current study, obesity was the most common risk factor. The clinical significance of this finding is that obesity may affect endometrial tissue by changing hormones and/or inflammation. Peripheral estrogen production occurs from excess adipose tissue, especially after menopause and may lead to endometrial proliferation from chronic estrogen exposure in the absence of an adequate progestin effect. Obesity is also typically accompanied by insulin resistance, chronic low-grade inflammation and abnormal levels of adipokines, which can all play a role in the malignant transformation of the endometrium. The current study identified significant correlation between obesity and high grade tumors, which may mean that obesity not only is a risk factor for developing endometrial cancer, but also may be a risk factor for more aggressive disease patterns [14].

Furthermore, diabetes mellitus was frequently observed in the study participants and was found to be significant with high grade endometrial cancer. Hyperinsulinemia, insulin resistance and elevated insulin like growth factor activity may account for the association between diabetes and endometrial cancer. These mechanisms can favour cell proliferation and inhibit apoptosis, which helps the proliferation of tumour cells. Diabetic women may also be obese and hypertensive, adding to the metabolic load. In this study, the risk of high grade was higher in patients with diabetes, supporting the need for close gynecological surveillance of diabetic women, particularly their women with abnormal uterine bleeding or postmenopausal bleeding [15-17].

Over 50% of the patients had hypertension, and high grade tumor status was also significantly associated with hypertension. While hypertension cannot alone cause endometrial cancer, it can be one part of a larger pattern of a metabolic syndrome. This condition may be indicative of chronic metabolic disturbance, endothelial dysfunction and systemic inflammation, which are commonly associated with obesity and diabetes. The presence of all three conditions (obesity, diabetes, and hypertension) was the most strongly associated with high-grade

endometrial cancer in the present study. The discovery implies that a combination of various metabolic disorders could have a greater impact than any one factor [18-20].

The histopathological analysis revealed that endometrioid carcinoma was the most frequent type, which is consistent with the typical morphology of endometrial cancer. The majority of the patients were post menstrual, and the most common chief complaint was post menstrual bleeding. This underscores the importance of early evaluation of postmenopausal bleeding, especially if the woman is obese, diabetic, or a smoker. The results of the study underscore the important place for metabolic screening in women at risk, as well as indicate a possible preventive value for lifestyle modification, weight control, blood glucose regulation, and blood pressure control. The study was limited however due to its single center design and small sample size. The need for larger multicenter studies to verify the results and to investigate the long-term effects of metabolic risk factors on outcome or survival and recurrence.

CONCLUSION

This study concluded that obesity, diabetes mellitus, and hypertension were frequently present among women with endometrial cancer. Obesity was the most common metabolic risk factor, followed by hypertension and diabetes mellitus. A significant association was observed between these metabolic conditions and high-grade endometrial cancer, with the strongest association seen in patients having all three risk factors together. These findings suggest that metabolic disorders may play an important role in the clinical profile and severity of endometrial cancer. Early identification and management of obesity, diabetes, and hypertension may help in reducing risk and improving clinical outcomes in women vulnerable to endometrial cancer.

REFERENCES

1. Park, B.J.J.o.g.o., *Associations between obesity, metabolic syndrome, and endometrial cancer risk in East Asian women*. 2022. 33(4): p. e35.
2. Zhao, J., et al., *Risk factors of endometrial cancer in patients with endometrial hyperplasia: implication for clinical treatments*. 2021. 21(1): p. 312.
3. Kokts-Porietis, R.L., et al., *Obesity and mortality among endometrial cancer*

4. Zhang, H., et al., *Correlation of metabolic factors with endometrial atypical hyperplasia and endometrial cancer: development and assessment of a new predictive nomogram*. 2021: p. 7937-7949.
5. Liu, F., E.C. Cheung, and T.T.J.M. Lao, *Obesity increases endometrial cancer risk in Chinese women with postmenopausal bleeding*. 2021. 28(10): p. 1093-1098.
6. Begum, S.A., T. Mahmud, and M.J.B.M.R.C.B. Amatullah, *Association of endometrial carcinoma with obesity and diabetes mellitus: endometrial carcinoma among obese and diabetics*. 2020. 46(2): p. 120-127.
7. Donkers, H., et al., *Obesity and visceral fat: survival impact in high-grade endometrial cancer*. 2021. 256: p. 425-432.
8. Lees, B., et al., *A population-based study of causes of death after endometrial cancer according to major risk factors*. 2021. 160(3): p. 655-659.
9. Ellis, P.E., G.A. Barron, and G.J.G.o. Bermano, *Adipocytokines and their relationship to endometrial cancer risk: A systematic review and meta-analysis*. 2020. 158(2): p. 507-516.
10. Sağnıç, S.J.R.O.H.H.D., *Obesity and endometrial cancer*. 2021. 1: p. 53.
11. Wang, L., et al., *Association between metabolic syndrome and endometrial cancer risk: a systematic review and meta-analysis of observational studies*. 2020. 12(10): p. 9825.
12. Güzel, A.B., et al., *The impact of morbid obesity on survival of endometrial cancer*. 2020. 17(3): p. 209.
13. Cuilan, G., et al., *Obesity, endogenous hormones, and endometrial cancer risk*. 2021. 35(3).
14. 1Rodriguez, A.M., et al., *Factors associated with endometrial cancer and hyperplasia among middle-aged and older Hispanics*. 2021. 160(1): p. 16-23.
15. 1Wang, Y., et al., *Diabetes mellitus and endometrial carcinoma: risk factors and etiological links*. 2022. 101(34): p. e30299.
16. Zabuliene, L., et al., *Risk of endometrial cancer in women with diabetes: A population-based retrospective cohort study*. 2021. 10(16): p. 3453.
17. Jo, H., et al., *Metabolic syndrome as a risk factor of endometrial cancer: a nationwide population-based cohort study of 2.8 million women in South Korea*. 2022. 12: p. 872995.
18. Yang, X., et al., *Effects of metabolic syndrome and its components on the prognosis of endometrial cancer*. 2021. 12: p. 780769.
19. Kokts-Porietis, R.L., et al., *Prospective cohort study of pre-and postdiagnosis obesity and endometrial cancer survival*. 2022. 114(3): p. 409-418.
20. Beavis, A.L., et al., *Prevalence of endometrial cancer symptoms among overweight and obese women presenting to a multidisciplinary weight management center*. 2020. 34: p. 100643.