To cite this article: Dilbaz K, Arabacı E, Ünlübilgin E, et al. The relationship between preoperative glycosylated hemoglobin levels and postoperative wound complications in diabetic patients undergoing hysterectomy. Turk J Womens Health Neonatol 2024; 6(2): 59-68.

Original Article

The Relationship Between Preoperative Glycosylated Hemoglobin Levels and Postoperative Wound Complications in Diabetic Patients Undergoing Hysterectomy

Histerektomi Operasyonu Geçiren Diyabetik Hastalarda Preoperatif Glikolize Hemoglobin Seviyesi ile Postoperatif Yara Yeri Komplikasyonları Arasındaki İlişki

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Abstract

Objective: The aim of this study is to investigate whether there is a relationship between glycosylated hemoglobin (HbA1c) and wound complications in diabetic women who have undergone hysterectomy for benign reasons.

Material and Methods: Our retrospective observational study included 153 patients with diabetes mellitus and 154 women without diabetes mellitus who underwent total abdominal (open) hysterectomy for benign reasons at the Gynecology Clinic of Health Sciences University Etlik Zübeyde Hanım Women's Diseases Training and Research Hospital between January 2016 and November 2022. The HbA1c level and the preoperative fasting blood glucose level were evaluated in 2 groups as patients with and without wound complication. These values were compared with the significance of the results of complications at the wound site.

Results: The study included 307 patients who underwent hysterectomy. All patients underwent open hysterectomy and preoperative 2 g of cefazolin was administered intravenously prophylactically. When the presence of comorbidities (comorbidities other than diabetes mellitus) was analyzed to assess the general health of the patients, a significant difference was found between the groups ($p<0.001$). 42.2% of patients in the control group and 99.3% of patients in the study group had a diagnosis for a comorbid condition. The HbA1c level and fasting blood glucose level before surgery were not statistically significant in distinguishing wound complications ($p=0.588$ and $p=0.967$, respectively). The postoperative 1st day White blood cell (WBC) count was higher in the study group than the control (12611.38±3287.71 vs. 11075.18±3032.68, p 0.013).

Conclusion: In our study, no significant association was found between HbA1c levels and wound complications in patients undergoing hysterectomy for benign reasons. However, it was found that the postoperative 1st day WBC count had predictive value for the wound complication in this population.

Keywords: Glycosylated haemoglobin (HbA1c); blood glucose level; hysterectomy; surgical site infection

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DOI: 10.46969/EZH.1478530
Received: 04.05.2024 Accepted: 16.05.2024

Volume 6 Number 2 p: 59-68

Öz

Amaç: Bu çalışmanın amacı, benign nedenlerle histerektomi geçiren diyabetik kadınlarda glikolize hemoglobin (HbA1c) ile yara komplikasyonları arasında bir ilişki olup olmadığını araştırmaktır.

Gereç ve Yöntemler: Retrospektif gözlemsel çalışmamıza Ocak 2016- Kasım 2022 tarihleri arasında Sağlık Bilimleri Üniversitesi Etlik Zübeyde Hanım Kadın Hastalıkları Eğitim Araştırma Hastanesi jinekoloji kliniğinde benign nedenler ile total abdominal (açık) histerektomi yapılan ve diabetes mellitus tanısı olan 153 hasta çalışma grubu, diabetes mellitus tanısı olmayan 154 hasta kontrol grubu olarak dahil edilmiştir. HbA1c düzeyi ve ameliyat öncesi açlık kan şekeri düzeyi, yara komplikasyonu olan ve olmayan hastalar olarak 2 grupta değerlendirildi. Bu değerler yara yerindeki komplikasyonların sonuçlarının anlamlılığı ile karşılaştırıldı.

Bulgular: Çalışmaya histerektomi yapılan 307 hasta dahil edildi. Tüm hastalara açık histerektomi yapıldı ve ameliyat öncesi profilaktik olarak 2 g sefazolin intravenöz olarak uygulandı. Hastaların genel sağlığını değerlendirmek için komorbidite (diabetes mellitus dışındaki komorbiditeler) varlığı analiz edildiğinde, gruplar arasında anlamlı bir fark bulundu ($p<0.001$). Kontrol grubundaki hastaların %42,2'si ve çalışma grubundaki hastaların %99,3'ü komorbid bir durum için tanı almıştır. Ameliyat öncesi HbA1c düzeyi ve açlık kan şekeri düzeyi yara komplikasyonlarını ayırt etmede istatistiksel olarak anlamlı değildi (sırasıyla $p=0.588$ ve $p=0.967$). Ameliyat sonrası 1. gün beyaz kan hücresi (BK) sayısı çalışma grubunda kontrol grubuna göre daha yüksekti (12611.38±3287.71 vs. 11075.18±3032.68, p 0.013).

Sonuç: Çalışmamızda, benign nedenlerle histerektomi yapılan hastalarda HbA1c düzeyleri ile yara komplikasyonları arasında anlamlı bir ilişki bulunmamıştır. Bununla birlikte, postoperatif 1. gün WBC sayısının bu popülasyonda yara komplikasyonu için prediktif değeri olduğu bulunmuştur.

Anahtar Kelimeler: Glikolize hemoglobin (HbA1c); kan şekeri düzeyi; histerektomi; cerrahi alan enfeksiyonu

1. Introduction

Wound complications (surgical site infections (SSIs), wound dehiscence, delayed wound healing, etc.) can impair healing of the surgical incision, prolong hospitalization and treatment time, and increase treatment costs; severe infections can have a negative impact on patient mortality and morbidity (1,2). SSIs are responsible for 22% of all hospital-acquired infections (3). Hysterectomy is one of the most commonly performed operations in women. In SSIs following hysterectomy, infectious agents can originate from both the patient's skin and the vaginal canal (4). The diversity of infectious agents is one of the factors influencing the width of antibiotics to be used in treatment and the success of treatment. The incidence of SSI after hysterectomy is 9-10% (5,6). In addition, open abdominal procedures have a higher risk of SSI than laparoscopic or vaginal procedures (7-9).

Known risk factors for wound complications include age, American Society of Anaesthesiology Classification (ASA) score, diabetes mellitus, smoking, previous surgery, previous infection, chronic skin disease, amount of intraoperative blood loss and duration of surgery. Diabetes mellitus is a systemic disease that alters blood glucose metabolism and is one of the most common risk factors for postoperative wound infections (10-12). There are numerous studies demonstrating the impact of hyperglycemia on postoperative outcomes. Most of these studies have focused on determining the ideal preoperative HbA1c level and blood glucose level for a low complication rate in elective surgery (13-16).

Recent studies have shown the usefulness of measuring HbA1c prior to surgery to identify diabetic patients and have found that HbA1c levels were high in patients with infections (17,18). Studies in the literature have shown a positive correlation between HbA1c levels and surgical site infection rates. Adequate glycemic control and monitoring of levels are critical in the management of SSI (19,20).

The aim of this study is to contribute to the limited knowledge in the literature on this topic and to investigate whether there is an.

2. Materials and Methods

Our retrospective cross-sectional observational study included 153 patients with diabetes mellitus and 154 patients without diabetes mellitus who underwent hysterectomy for benign reasons at the Gynecology Clinic of University of Health Sciences Etlik Zübeyde Hanım Women's Health Training and Research Hospital between January 2016 and November 2022.

The patients' data were scanned retrospectively from the patient record system. The study protocol was approved by the Medical Speciality Education Board of University of Health Sciences Etlik Zübeyde Hanım Women's Health Training and Research Hospital (Decision No.: 16/26.12.2022). Demographic and clinical characteristics were obtained from the patients' medical records. Age, parity, body mass index (BMI), history of comorbidities, history of diabetes mellitus, medications, indication for surgery, type of abdominal incision (Pfannenstiel, median umbilicus, Maylard, etc.), presence of complications during surgery, history of blood transfusion, preoperative HbA1c level, preoperative hemoglobin (Hb) and white blood cell (WBC) levels, postoperative Hb and WBC levels at 24 hours. The following information was obtained from the medical records: postoperative Hb and WBC values at 24 hours, length of hospital stay, presence of complications at the wound site (wound dehiscence, discharge, infection), culture result and treatment method of the complication, if applicable, and the values obtained were recorded in the patient's follow-up form.

The wound cultures were analyzed in our hospital's microbiology laboratory. Swabs or infected swab samples from the wound site were cultured on chocolate agar, blood agar and emb agar and observed for 48 hours. If colonies were detected, slides were removed and the culture of the wound site was considered positive on microscopic examination if bacteria and leukocytes were present and examined for antibiogram studies.

Patients with and without diabetes mellitus (n:307) underwent laparotomy (open hysterectomy). The operations were performed under general anesthesia. During surgery, electrocardiogram, airway pressure and blood oxygen were monitored, urinary catheters and other devices were placed. All patients participating in the study received 2 g of cefazolin intravenously preoperatively (within 30 minutes before the start of surgery) as prophylaxis against surgical site infections. HbA1c levels and preoperative fasting blood glucose levels were evaluated and these values were compared with the significance of wound healing complication outcomes. Wound cultures were obtained in 15 of the patients (n:16) in whom wound complications (subcutaneous dehiscence of the skin, fascial dehiscence, discharge, infection, evisceration) were noted. Patients (n:8) who were found to have growth in the wound culture were considered positive for surgical wound infection. Patients who had undergone surgery for malignant diseases, patients who had undergone laparoscopic or vaginal surgery were not included in the study.

Statistical analysis

The data were analyzed using IBM SPSS V23. Agreement with the normal distribution was analyzed by Shapiro-Wilk and Kolmogorov-Smirnov tests. The chi-square test, Yates correction, Fisher's exact test and Fisher-Freeman-Halton test were used to compare categorical data by group. The Mann-Whitney U test was used to compare non-normally distributed data by binary groups. ROC analysis was used to determine the cut-off value of parameters to discriminate wound complication. Binary logistic regression analysis was used to analyze the risk factors influencing complications at the wound site. The significance level was set at $p<0.050$.

3. Results

The distribution of the demographic and clinical characteristics of the patients included in the study across the individual groups is shown in Table 1. Menopausal status differed between the groups ($p=0.006$). 27.7% of the control group and 43% of the study group were postmenopausal. When the presence of comorbidities (comorbidities other than diabetes mellitus) was analyzed to assess the general health status of the patients, a significant difference was found between the groups ($p<0.001$). 42.2% of the patients in the control group and 99.3% of the patients in the study group had a diagnosis of comorbidity. It was observed that 29.3% (n:90) of the participants had no comorbidity. These comorbidities included hypertension 55.7%, heart disease 2.7%, thyroid disease 20.1%, asthma 6.8% and others 2.7%. Indications for operation also differed between the groups ($p=0.004$). This difference is due to the difference in the indications for myoma uteri, hyperplasia without atypia and hyperplasia with atypia. 48.7% of the patients in the control group and 33.1% of the patients in the study group were operated for myoma uteri, 0% of the control group and 3.9% of the study group were operated for hyperplasia without atypia, 24.7% of the control group and 37% of the study group were operated for hyperplasia with atypia. The median ages differed between the groups ($p=0.001$). While the median age of the control group was 50.00 years, the median age of the study group was 51.50 years. The median parity differed according to the groups ($p=0,005$). While the median parity of the control group was 2.00, the median parity of the study group was 3.00. No significant difference was found between the distributions of other variables ($p>0.050$).

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Table 1. Comparison of demographic characteristics and clinical results according to groups				
	Control N=154	Study N=153	Total	p
Age (years)	51.10±6.77	53.81±7.91	52.45±7.47	**0.001*****
Parity	2.53±1.36	2.97±1.32	2.76±1.36	**0.005*****
Postmenopause				
No	107 (72.3)	88(57)	193 (64.5)	**0.006***
Yes	41 (27.7)	65 (43)	106 (35.5)	
Body Mass Index (BMI)				
<30	15 (26.3)	14 (22.2)	29 (24.2)	0.757**
>30	42 (73.7)	49 (77.8)	91 (75.8)	
Comorbidities				
No	89 (57.8)	1 (0.7)	90 (29.3)	**<0.001***
Yes	65 (42.2)	152 (99.3)	217 (70.7)	
The reason for hysterectomy				
Fibroids	75 (48.7)a	51 (33.1)b	126 (40.9)	**0.004********
Treatment-resistant bleeding	13 (8.4)	11 (7.1)	24 (7.8)	
Adnexal mass	28 (18.2)	29 (18.8)	57 (18.5)	
Hyperplasia without atypia	0 (0)a	6 (3.9)b	6 (1.9)	
Atypical hyperplasia	38 (24.7)a	57 (37)b	95 (30.8)	
Abdominal incision type				
Phannelstiel	86 (55.8)	72 (46.8)	158 (51.3)	0.296****
Sub-umbilical median incision	49 (31.8)	60 (39)	109 (35.4)	
Abdominal median incision	19 (12.3)	21 (13.6)	40 (13)	
Maylard	0 (0)	1 (0.6)	1 (0.3)	
Complications				
No	148 (96.7)	149 (97.4)	297 (97.1)	1.000***
Yes	5 (3.3)	4 (2.6)	9 (2.9)	
Surgical site infection				
No	140 (91.5)	138 (89.6)	278 (90.6)	0.710**
Yes	13 (8.5)	16 (10.4)	29 (9.4)	
Wound site complication				
Subcutaneous skin opening	2 (15.4)	4 (25)	6 (20.7)	0.757****
Opening Fascia	1 (7.7)	0 (0)	1 (3.4)	
Discharge	6 (46.2)	5 (31.3)	11 (37.9)	
Infection	3 (23.1)	6 (37.5)	9 (31)	
Evisseration	1 (7.7)	1 (6.3)	2 (6.9)	

*Chi-square test, **Yates correction, ***Fisher's Exact test, ****Fisher-Freeman-Halton test, *****Mann-Whitney U test, frequency (percentage), mean±standard deviation, median (minimum - maximum).

Table 1. Continued				
	Control N=154	Study N=153	Total	p
Wound site culture				
No	141 (91.6)	139 (90.3)	280 (90.9)	0.843**
Yes	13 (8.4)	15 (9.7)	28 (9.1)	
Wound culture results				
No growth	144 (94.7)	143 (94.7)	287 (94.7)	1.000**
Growth+	8 (5.3)	8 (5.3)	16 (5.3)	
Breeding microorganism				
E coli	1 (14.3)	2 (22.2)	3 (18.8)	
Enterococcus spp	0 (0)	1 (11.1)	1 (6.3)	
Klebsiella	1 (14.3)	0 (0)	1 (6.3)	
Coagulase-negative Staphylococcus aureus	1 (14.3)	0 (0)	1 (6.3)	
Proteus	0 (0)	1 (11.1)	1 (6.3)	
Pseudomonas aeruginosa	1 (14.3)	0 (0)	1 (6.3)	
Serratia marcescens	0 (0)	1 (11.1)	1 (6.3)	
Staphylococcus aureus	0 (0)	1 (11.1)	1 (6.3)	
Staphylococcus spp	1 (14.3)	0 (0)	1 (6.3)	
*Chi-square test, **Yates correction, ***Fisher's Exact test, ****Fisher-Freeman-Halton test, *****Mann-Whitney U test, frequency (percentage), mean±standard deviation, median (minimum - maximum).				

The AUC value (area under the curve) of preoperative fasting blood glucose to discriminate wound site complications was 0.459 and the AUC value was not statistically significant (p=0.588). The AUC value of preoperative HbA1c to discriminate wound site complications was 0.497 and the AUC value was not statistically significant (p=0.967) (Table 2).

There was no significant difference between the medians of preoperative fasting blood glucose and HbA1c values according to wound complication (p-values 0.588 and 0.967, respectively) (Table 3).

Risk factors affecting wound complications were analyzed using a binary logistic regression analysis as a univariate model. Increased WBC is an indicator of infection and inflammatory process, and as a result of the univariate model, it was found that the higher the Wbc, the 6.467-fold increase in the risk of wound complication (p=0.013). As the length of hospitalization increased, the risk of wound complications increased 1.252-fold (p=0.001). Other variables had no statistically significant effect (p>0.050) (Table 4).

Table 2. ROC analysis of preop fasting glucose and HbA1c parameters in predicting wound complications in the study group

	AUC (%95 CI)	p
Preoperative glucose	0.459 (0.272 – 0.645)	0.588
Preoperative glycated haemoglobin (HbA1c)	0.497 (0.328 – 0.665)	0.967

Table 3. Comparison of preop fasting blood glucose and HbA1c values according to wound complication

	Wound site complication		p
	No	Yes	
Preoperative glucose	143.38±47.7	147.69±72.34	0.588
Preoperative glycated haemoglobin (HbA1c)	7.14±1.24	7.17±1.36	0.967

Table 4. Examination of risk factors affecting wound complications				
	Wound site complication		Univariate	
	No	Yes	OR (%95 CI)	p
Age (years)	52.31±7.40	53.83±8.25	1.026 (0.978 – 1.076)	0.300
Postmenopause				
No	177 (91.7)	16 (8.3)	-	
Yes	93 (87.7)	13 (12.3)	1.546 (0.713 – 3.352)	0.269
Body Mass Index (kg/m^2)				
<30	28 (96.6)	1 (3.4)	-	
≥30	83 (91.2)	8 (8.8)	2.699 (0.323 – 22.541)	0.359
Preoperative glucose	123.92±41.82	125.38±59.22	1.001 (0.992 - 1.009)	0.864
Preoperative hemoglobin	12.39±1.70	12.66±1.64	1.099 (0.871 - 1.386)	0.425
Postoperative 1 st day hemoglobin	10.58±1.48	10.91±1.37	1.166 (0.896 - 1.516)	0.254
Postoperative 1 st day white blood cell count	11075.18±3032.68	12611.38±3287.71	6.467 (1.478 - 28.306)	**0.013**
Hospitilization (days)	3.48±1.58	5.31±4.75	1.252 (1.101 - 1.424)	**0.001**

4. Discussion

It is well known that hysterectomy significantly affects women's physical and mental health, apart from the economic burden it entails. SSIs affect the body tissues, cavities and organs invaded during surgery and usually occur within 30 days of the surgical procedure (21). Risk factors for SSI include age, obesity, malnutrition, low socioeconomic status, preoperative anemia, and comorbidities such as diabetes and hypertension (6,22-24). A summary of results in risk faktors for SSI in Table 5. Many factors for SSI are thought to be modifiable during the surgical procedure (4), and prophylactic use of antibiotics is known to be important for prevention (6). The Centers for Disease Control and Prevention (CDC) guidelines (25) recommend prophylactic administration of antibiotics less than 30 minutes before the start of surgery, repeated administration of antibiotics if blood loss exceeds 1.5 liters or the duration of surgery exceeds 3 hours, and adequate control of concomitant diseases such as diabetes mellitus (6,26). Our study is a single-center study and we think that the implementation of CDC guideline recommendations in our hospital is one of the reasons for our low SSI rate.

Göksever Çelik et al. found that the percentage of SSI was higher in patients who underwent abdominal hysterectomy than in patients who underwent laparoscopic and vaginal hysterectomy (6). In addition, Lake et al. found that the risk of postoperative cellulitis was higher after an abdominal hysterectomy than after a vaginal approach (7). The finding the decreased occurrence of superficial SSI after vaginal approach for hysterectomy reaffirms the long appreciated role for vaginal hysterectomy as the route of choice for hysterectomy (27). All patients in our study underwent abdominal hysterectomy. Although there was no difference in the surgical method, no significant association was found between wound complications and the difference in the type of abdominal incision.

Blankush et al. have shown that preoperative HbA1c levels in 2200 patients undergoing non-emergency procedures, although not independently associated with the risk of postoperative infection, may still be useful in predicting increased risk of infection (28). Werner et al. analyzed data from 7958 diabetic patients undergoing open surgery for carpal tunnel syndrome and found that elevated HbA1c levels were associated with an increased rate of SSI in patients with perioperative HbA1c levels between 7 and 8 mg/dL (29). In addition, perioperative glycemic control was found to be as important as preoperative HbA1c and blood glucose levels in terms of SSI prevention (30,31). Wang et al. showed that preoperative HbA1c was the best predictor of SSI (13). In our study, HbA1c and blood glucose values were analyzed, but no statistically significant association was found in relation to wound complications. Our study showed that wound complications in diabetic patients cannot be predicted by HbA1c levels.

Table 5. Summary of results from different studies for SSI risk factors

Authors and year	Aim of study	Study design	Sample size	Study population	Risk factors for SSI
Goksever Celik et al., 2017	To define the clinical and labora-tory characteristics of patients who had SSI after hysterectomy	Retrospective cohort study	840	Patients who have undergone hysterec-tomy and reported postoperative SSI	High BMI, blood loss during surgery, low hematocrit level and associated anemia
Lake et al., 2013	Estimating the occurrence of SSI after hysterectomy and the associ-ated risk factors	Cross-sectional analysis	13822	Women undergoing hysterectomies performed by gyne-cologic services	The hysterectomy method (laparotomy), length of surgery time, American Society of Anesthesiologist Class ≥ 3, body mass index ≥ 40kg/m2, and diabetes
Mahdi et al., 2014	Estimating the rate and predictors of SSI after hysterectomy and to identify any association between SSI and other postoperative comp-lications	Retrospective cohort study	758	Patient who un-derwent hysterec-tomy due to benign indications from 2005 to 2011	Blood transfusion, longer operative time (> 3 hours), local tissue trauma , higher glycemic and thermal dysregu-lation, and breaking sterile techniques
Lenz et al., 2016	The risk factors and outcome after coronary artery bypass grafting in diabetic patients	Retrospective analysis	590	Patient in the cardio-vascular surgery clinic	Diabetic, pre- and perioperati-ve management of the blood-glucose level, obesity
Sharif et al., 2019	Summarising current sternal wound infection literature diagno-sing	Literature review	-	Patients with sternal wound infection	Body mass index ≥ 30 kg/m2, peripheral vascular disease, chronic obstructive pulmonary disease, DM
Wang et al., 2022	Perioperative blood glycemic monitoring for the incidence of SSI among patients with type II DM during the 1-year follow-up after emergent orthopedic surgery	Retrospective, observational study	604	Patients with type II DM older than 50 years old and who received surgery for a lower limb fractu-re	Preoperative HbA1c > 7.85%, postoperative HbA1c > 6.65%, preoperative blood glucose > 130.50 mg/dl, postoperative blood glucose > 148.5 mg/dL, rheumatoid arthritis
Frisch et al., 2010	To determine the effect of periope-rative hyperglycemia on clinical outcomes in general and non-cardiac surgery patients	Retrospective observational study	3184	All patients who underwent inpatient noncardiac surgical procedures	Perioperative hyperglycemia significantly increased the risk of pneumonia, systemic blood infections, urinary tract infec-tion, skin infections during the postoperative period
Jämsen et al., 2010	Analyzing of preoperative scree-ning for hyperglycemia in identif-ying patients predisposed to infec-ted knee replacement	Retrospective study	1565	Patients undergoing primary total knee replacement due to osteoarthritis	Obesity and hyperglycemia

Table 5. Continued

Authors and year	Aim of study	Study design	Sample size	Study population	Risk factors for SSI
Carranza-Lira et al., 2020	To compare the concentration of HbA1c between patients with and without SSI after hysterectomy	Prospective, cross-sectional and comparative study	47	Postoperative wo-men with total ab-dominal (open) hysterectomy	HbA1c > 5.7%
Gatti et al., 2016	Investigating the prevalence of increased HbA1c and its impact on the development of SWI in patients undergoing isolated coro-nary artery bypass grafting	Prospective study	2130	All patients of enrol-led E-CABG and undergoing surgery	HbA1c >70 mmol/mol (8.6%)
Shi et al., 2021	To analyze the potential risk fac-tors of SSI in patients with endo-metrial carcinoma	Retrospective study	318	Patients with endo-metrial carcinoma who underwent surgery treatment	the longer drainage of the surgical site, late removal of the drainage tube after surgery, postoperative serum albu-min < 30 g/L, postoperative blood glucose ≥ 10 mmol/L
Lachiewicz et al., 2015	The risk factors for developing SSI following a gyne-cological procedure	Literature review	-	Patients undergoing gynecological sur-gery	Obesity, extended procedure (≥3 hours) or with a total blood loss ≥1500 mL, hyste-rectomy with the abdominal method, failure to prepare the skin and vagina before sur-gery, DM(particularly periope-rative serum glucose le-vels>150 mg/dL and preopera-tive hemoglobin HbA1c> 6.5%)
Blankush et al., 2016	The correlation between elevated pre-operative HbA1c and post-operative infections	Retrospective study	2200	Patients undergoing non-emergent proce-dures	Age, surgical risk classifica-tion, and wound classification (clean, clean/contaminated, contaminated, dirty)
Werner et al., 2019	The association of HbA1c levels in diabetic patients with the incidence of SSI fol-lowing open carpal tunnel release	Retrospective study	7958	Patients who un-derwent open CTR	perioperative HbA1c between 7 and 8 mg/dL
Molina et al., 2015	To evaluate risk factors of deep infection following pilon fractures	Retrospective study	400	All patients with pilon fractures	Open fractures, hypertension and male gender

There are many studies in the literature with different opinions on the relationship between BMI and the development of SSI. Some previous studies have reported that patients with higher BMI have thicker subcutaneous adipose tissue, poorer blood supply to the adipose tissue, and are prone to fat necrosis, which is associated with the development of SSI (32,33). In contrast to the results of these studies, Shi et al. found no association between BMI and SSI in their study (19). In our study, no statistically significant association was found between BMI and wound complication. This could be related to the small sample size. Prospective studies with larger sample sizes are needed in the future to confirm our findings.

Our study showed that wound complications cannot be predicted by HbA1c levels. However, we believe that perioperative blood glucose regulation and control is important for the patient's healing process and that blood glucose regulation accelerates wound tissue healing time even if there are no complications at the wound site. For this reason, we recommend determining the perioperative HbA1c level and regulating blood glucose levels when blood glucose levels are high. The small number of patients and the retrospective design are the weaknesses of our study. The strengths of our study are that the patients were treated and followed up in a tertiary center and that their information was complete and accessible in the data system. We need a larger number of patients and further investigation to determine whether there is a significant association between HbA1c levels and wound complications in diabetic women undergoing hysterectomy for benign reasons.

In conclusion, no significant association was observed between HbA1c levels and wound complications in diabetic women undergoing hysterectomy for benign reasons. However, the postoperative 1st day WBC count had predicitive value for wound complication in this population.

Author contribution

Study conception and design: TK, EA, KD, EÜ; data collection: KD, EÜ, EA, FK; analysis and interpretation of results: KD, SK, FK, TK; draft manuscript preparation: KD, EÜ, TK, SK, FK, YEÜ. All authors reviewed the results and approved the final version of the manuscript.

Ethical approval

The study was approved by the Ethics Committee for Non-Interventional Studies of Etlik Zubeyde Hanim Women Health Education Research Hospital (Protocol no. 16/26.12.2022).

Funding

The authors declare that the study received no funding.

Conflict of interest

The authors declare that there is no conflict of interest.

Yazar katkısı

Araştırma fikri ve tasarımı: TK, EA, KD, EÜ; veri toplama: KD, EÜ, EA, FK; sonuçların analizi ve yorumlanması: KD, SK, FK, TK; araştırma metnini hazırlama: KD, EÜ, TK, SK, FK, YEÜ. Tüm yazarlar araştırma sonuçlarını gözden geçirdi ve araştırmanın son halini onayladı.

Etik kurul onayı

Bu araştırma için Etlik Zübeyde Hanım Kadın Hastalıkları Eğitim ve Araştırma Hastanesi Girişimsel Olmayan Çalışmalar Etik Kurulundan onay alınmıştır (Karar no: 16/26.12.2022).

Finansal destek

Yazarlar araştırma için finansal bir destek almadıklarını beyan etmiştir.

Çıkar çatışması

Yazarlar herhangi bir çıkar çatışması olmadığını beyan etmiştir.

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