DOI: 10.55522/jmpas.V14I2.6863 **ISSN NO. 2320 – 7418**

International peer reviewed open access journal

Journal of Medical Pharmaceutical and Allied Sciences

Journal homepage: www.jmpas.com CODEN: JMPACO

Research article

Antibiotic prophylaxis and postoperative outcomes in hysterectomy: a prospective observational study

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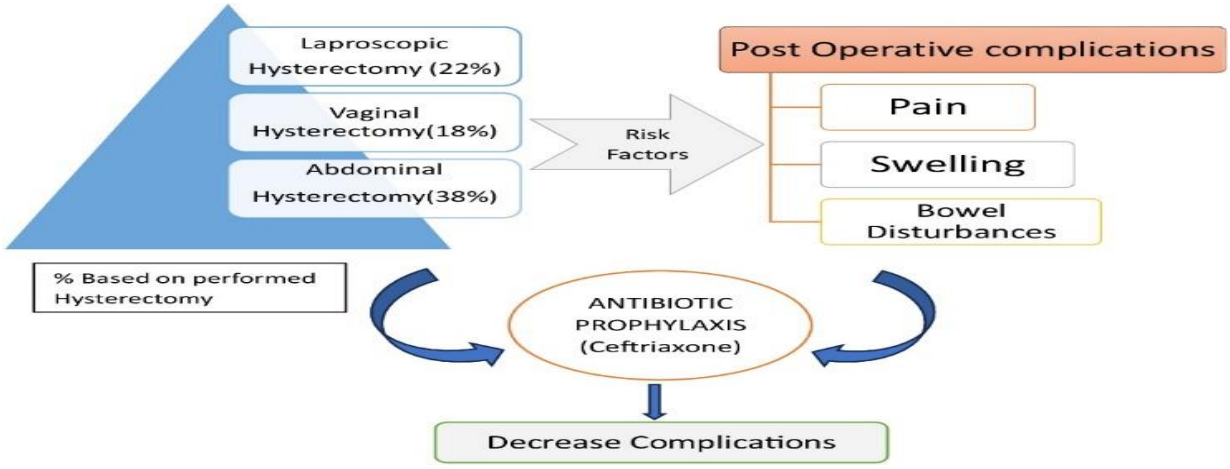
Received - 04-03-2025**, Revised** - 23-03-2025, **Accepted** - 31-03-2025 **(DD-MM-YYYY)**

Refer This Article

Sai Srinidhi Viswanadhapalli, Dhanya Siri Singari, Geethika Vardhanapu, Anju K Abraham, 2025. Antibiotic prophylaxis and postoperative outcomes in hysterectomy: a prospective observational study. Journal of medical pharmaceutical and allied sciences, V 14 - I 2, Pages - 014 – 020. Doi: https://doi.org/10.55522/jmpas.V14I2.6863.

ABSTRACT

Hysterectomy is a commonly performed gynecological surgery, but postoperative complications remain a significant concern. This study aimed to assess the impact of antibiotic prophylaxis, obesity, comorbidities, and surgical techniques on post-hysterectomy complications. This prospective observational study was conducted over a total of 50 women undergoing different types of hysterectomies, who were enrolled. Patient data, including age, BMI, comorbidities, type of hysterectomy, antibiotic usage, and postoperative complications, were collected from medical records and patient follow-ups. Statistical analysis was performed using the Chi-square test, with $p < 0.05$ considered significant. Women aged 41–60 years constituted the majority of hysterectomy patients, with abdominal hysterectomy (38%) being the most frequently performed procedure. However, it was associated with higher postoperative complications, including pain (84%), swelling (68%), and bowel disturbances (47%). In contrast, laparoscopically assisted vaginal hysterectomy had lower complication rates, suggesting its advantages in reducing postoperative morbidity. Obesity and comorbidities, particularly diabetes and hypertension, significantly increased the risk of postoperative complications such as prolonged recovery, pain, and infection. The most frequently reported symptoms included constipation (42%), lethargy (82%), and hot flashes (32%). All patients received standard prophylactic antibiotics, regardless of hysterectomy type. Despite this, an SSI rate of 12% was observed, particularly in obese and diabetic patients, indicating the need for a more individualized approach to antibiotic prophylaxis. This study highlights the importance of preoperative risk assessment, tailored antibiotic prophylaxis, and postoperative management in improving patient outcomes following hysterectomy.



Keywords: Antibiotic, Prophylaxis, Surgical, Hysterectomy, Postoperative, Complications.

INTRODUCTION

Hysterectomy refers to the surgical removal of just the uterus whereas the total hysterectomy suggests the removal of the cervix as well. Post-operative infections are common and serious, combined with individual risk factors and prolonged hospital stays. They were emerging from prolonged hospital stays combined with individual pathological conditions [1]. Associated with several risk factors, post-operative infections arise even though preoperative antibiotic prophylactic treatment is provided, risk factors include age, based on anemic patients, and types of hysterectomy. This clinical study was conducted for 6 months and considered 50 patients monitored by questionnaires and checklist forms for complications. The primary focus of this study was the type and cause of complications that can arise despite the use of antibiotic prophylactics. clinical study outcomes show that among the 50 age group prone to gynecological disorders, patients who are overweight experience dysuria, hot flashes, pain, and bowel disturbances. Abdominal hysterectomy patients showed complications in 50 patients, 41 experienced lethargy, and menopausal women complained of hot flashes after hysterectomy [2].

The use of antibiotics to prevent infection at the surgical site is known as SAP. The risk of SSI can be decreased by appropriate antibiotic prophylactic use, but continued usage also raises the selective pressure that favors the growth of resistant organisms. Prophylactic antibiotics were commonly prescribed before surgeries [3]. Preventive antibiotics may be able to lower infection risk in certain high-risk patients. Prophylactic antibiotics are frequently misused for longer than the mandated 12- to 24-hour post-surgical interval [4]. An antibiogram is currently defined as a laboratory test that evaluates a patient's unique bacteria's resistance to several antibiotics. This can help medical professionals choose the best antibiotic to treat an ongoing infection [5]. Although hysterectomy is usually a safe procedure, some preoperative risk factors may make problems more likely. Even though prophylactic treatment is applied, certain complications may arise due to individual patients' previous risk factors after surgeries [6].

Table 1: Antibiotic prophylaxis regimen for hysterectomies

Regimen	Drug(s) Used
Recommended Regimen	Cefazolin: 2 g IV (3 g for patients over 120 kg), administered within 60 minutes before the surgical incision. Redosing is recommended if the procedure lasts longer than 4 hours or if there is excessive blood loss [7]. Ampicillin-sulbactam: 3 g IV, administered within 60 minutes before the surgical incision. Redosing is recommended after 2 hours[8]
Alternative Regimen 1	Clindamycin: 900 mg IV, administered within 60 minutes before the surgical incision; redosing is recommended every 6 hours during prolonged procedures. Vancomycin: 15 mg/kg IV, administered over 60 minutes, starting within 120 minutes before the surgical incision; no redosing is typically required. Gentamicin: 5 mg/kg IV, administered within 60 minutes before the surgical incision; no redosing is typically required [9].
Alternative Regimen 2	Metronidazole: 500 mg IV, administered within 60 minutes before the surgical incision; no redosing is typically required. Gentamicin: 5 mg/kg IV, administered within 60 minutes before the surgical incision; no redosing is typically required [10].

MATERIAL AND METHOD

Study Design and Setting

This prospective observational study was conducted in the Department of Obstetrics and Gynecology at GSL General Hospital and Medical College, Rajanagaram, Rajamahendravaram. The study was carried out over six months, from October 2023 to March 2024. The primary aim was to evaluate the use of prophylactic antibiotics and their impact on postoperative complications in patients undergoing hysterectomy. The study focused on collecting comprehensive clinical data to assess the association between antibiotic prophylaxis and post-surgical outcomes.

Study Population and Sample Size

The study population comprised inpatients from the Department of Gynaecology and Obstetrics who underwent hysterectomy during the study period. A total of 50 patients were selected based on predefined inclusion and exclusion criteria. The inclusion criteria required patients to be adults aged above 30 years, undergoing hysterectomy with prophylactic antibiotic use, and classified under clean-contaminated surgical procedures. Patients who were below 18 years of age, those undergoing dirty surgical procedures, individuals receiving therapeutic or non-surgical prophylaxis, emergency outpatient and emergency obstetrics ward patients, and those with pre-existing infections or prior antibiotic usage before surgery were excluded from the study.

Data Collection

Clinical data were collected directly from patient case reports and hospital records using a specially designed data collection form. The primary sources of data included patient medical history, symptoms, social background, and hospital admission records, which detailed the date, time, and initial diagnoses. Additional data were obtained from laboratory test results, including blood and urine investigations, as well as ultrasound imaging reports. Patient interviews and consultations with representatives were also conducted to gather supplementary information regarding postoperative complications and recovery. Informed consent was obtained from all study participants before data collection, ensuring ethical compliance and patient confidentiality.

Statistical Analysis

All collected data were systematically recorded and analyzed using Microsoft Excel. Descriptive statistical analysis was performed

to summarize patient characteristics and postoperative complications. The Chi-square test was employed to analyze categorical data and determine associations between different variables, particularly the impact of antibiotic prophylaxis on postoperative outcomes. A p-value of <0.05 was considered statistically significant, ensuring that the results were robust and reliable. Additionally, sample size adequacy for factor analysis was assessed using the Chi-square test to validate the study findings.

This study aimed to provide insights into the effectiveness of prophylactic antibiotics in hysterectomy procedures and identify key factors influencing postoperative complications. By analyzing patient characteristics, antibiotic usage, and surgical outcomes, the findings of this study contribute to the understanding of best practices for infection control and postoperative management in gynecological surgeries.

RESULTS

In our study, which involved 50 patients, the age range 41-60 years was observed to be the most prevalent hysterectomy among other age groups shown in **Error! Reference source not found.** [11].

Among 50 cases abdominal hysterectomy was the most common (19 cases), followed by laparoscopically assisted vaginal hysterectomy and total laparoscopic hysterectomy (both 11 cases each), and vaginal hysterectomy (9 cases) shown in Figure **1** [12]. Total abdominal hysterectomy had the highest incidence of pain, swelling, and bowel disturbances, while laparoscopically assisted vaginal hysterectomy showed the highest incidence of bowel disturbances and fever&chills. Total laparoscopic hysterectomy had moderate rates across most complications, vaginal hysterectomy has lower rates of most complications except for bowel disturbances and changes in urinary frequency. Diabetes emerges as the most prevalent, often co-existing with hypertension. Anemia, hyperthyroidism, and hypothyroidism are also notable shown in

Figure **2** [13].

Error! Reference source not found.**:** Age distribution

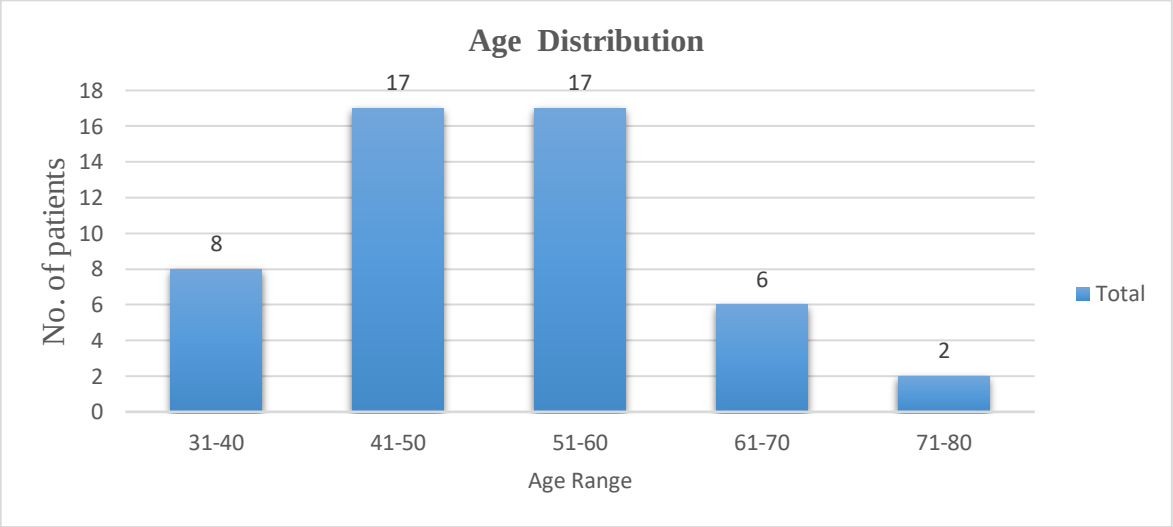


Figure 1: Types of hysterectomy

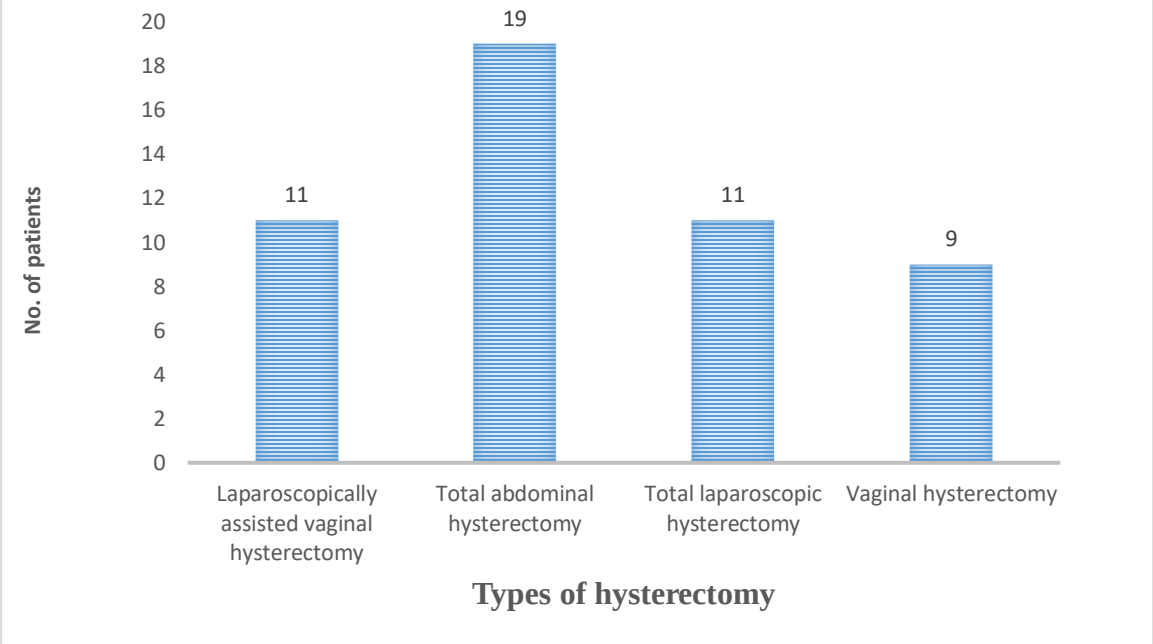


Figure 2: Distribution of Comorbidities among Hysterectomy Patients – The most common comorbidities observed were diabetes mellitus, hypertension, anemia, hyperthyroidism, and hypothyroidism, with diabetes being the most prevalent condition.

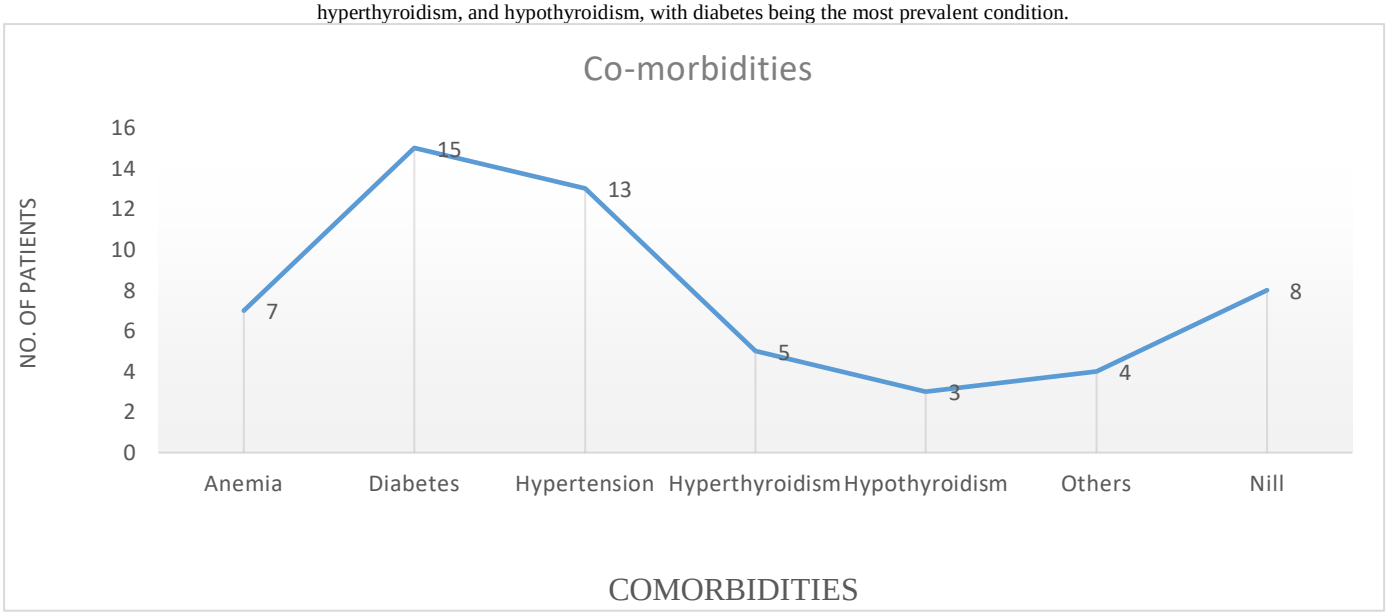
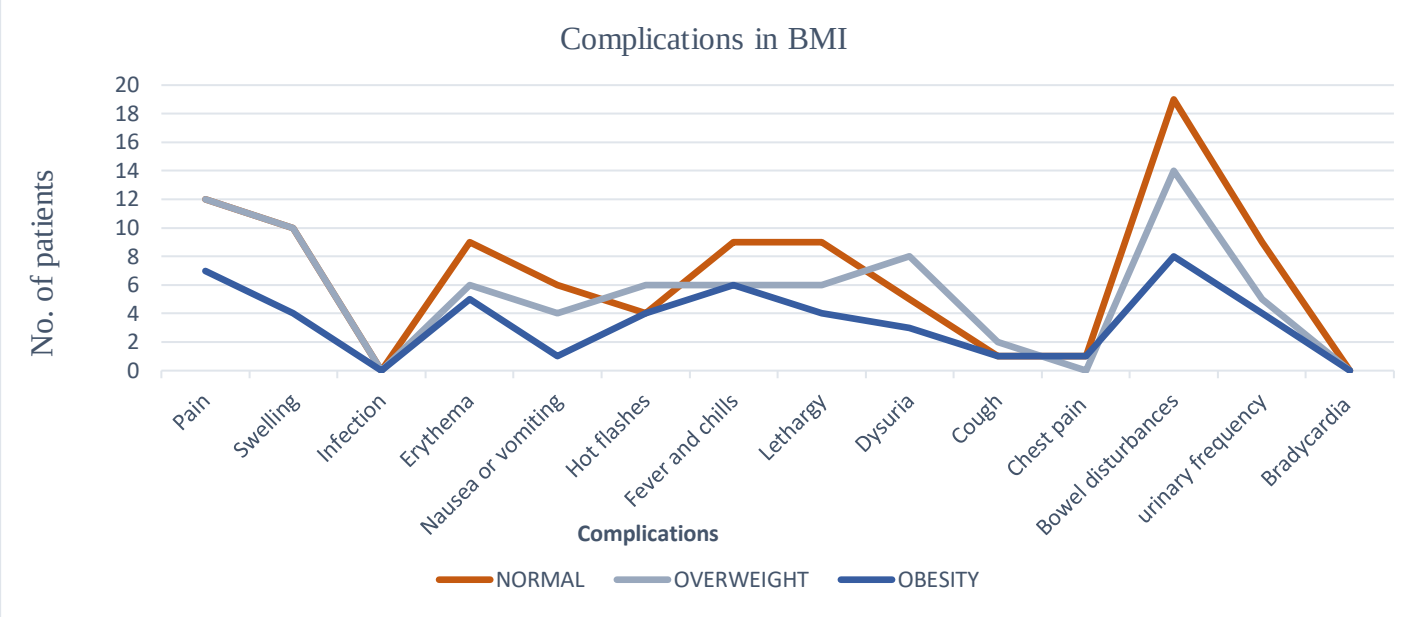


Figure 3: Distribution of postoperative complications based on BMI



Among the different types of hysterectomy performed, abdominal hysterectomy was the most common, comprising 38% (19/50) of cases, followed by laparoscopic ally assisted vaginal hysterectomy (LAVH) and total laparoscopic hysterectomy (TLH), both accounting for 22% (11/50) each and vaginal hysterectomy at 18% (9/50). Abdominal hysterectomy was associated with the highest rate of postoperative complications, including pain (84%), swelling (68%), and bowel disturbances (47%) [14]. Patients who underwent LAVH had fewer major complications but experienced a higher incidence of bowel disturbances (36%) and fever and chills (27%). TLH showed moderate complication rates across different parameters, while vaginal hysterectomy had lower rates of pain and swelling but presented a relatively higher incidence of bowel-related issues [15].

The study also analysed comorbidities among the patients and their impact on postoperative outcomes. Diabetes mellitus was the most common comorbidity, observed in 30% (15/50) of cases, followed by hypertension in 20% (10/50), anemia in 16% (8/50), hyperthyroidism in 10% (5/50), and hypothyroidism in 8% (4/50). Patients with diabetes and hypertension had a higher incidence of postoperative infections and prolonged recovery times [16]. The impact of BMI on postoperative complications was also assessed, and it was found that overweight (BMI 25–30) and obese patients (BMI >30) had significantly higher rates of pain (78%), swelling (69%), and bowel disturbances (55%). Normal-weight individuals (BMI <25) reported fewer complications, indicating a strong correlation between obesity and adverse post-surgical outcomes [17].

In terms of postoperative symptoms and recovery, constipation was the most frequently reported issue, affecting 42% (21/50) of patients, primarily due to anesthesia, opioid pain management, and reduced mobility [18]. Lethargy was another common complaint, reported by 82% (41/50) of patients, particularly those who underwent abdominal hysterectomy [19]. Additionally, menopausal women experienced a higher incidence of hot flashes, reported in 32% (16/50) of cases, suggesting that hormonal changes post-surgery played a role in symptom manifestation [20].

Regarding antibiotic usage and its impact on surgical site infections (SSI), all patients received the same standard prophylactic antibiotic regimen regardless of the type of hysterectomy performed. The overall rate of SSI was 12% (6/50), with a slightly higher prevalence among diabetic and obese patients. This highlights the importance of tailoring antibiotic prophylaxis based on patient-specific risk factors rather than following a uniform approach for all hysterectomy patients. Proper antibiotic administration, along with meticulous surgical techniques, plays a crucial role in minimizing postoperative infections and ensuring better patient outcomes [21]. Individuals with obesity and overweight tend to experience more complications like pain and bowel disturbances shown in Figure 3.

DISCUSSION

We investigated how risk factors and post-surgery infections relate to pre-surgery antibiotics. These infections are a serious problem, increasing hospital stays and costs. We found that age, health conditions, and proper antibiotic use are key. Using antibiotics correctly and careful surgery helps reduce infection risk. Following these steps greatly improves patient recovery [22].

We discovered that LAVH, a less invasive hysterectomy, resulted in fewer complications [23]. This technique means smaller cuts, less blood loss, and faster recovery. Compared to traditional abdominal surgery, LAVH patients experience less pain, shorter hospital stays, and lower infection risks, making it a preferable choice for many [24].

Most hysterectomies happened in women aged 41-60, totaling 34 out of 50. This age is often premenopausal, with conditions like fibroids and endometriosis [25]. Older women may need surgery

due to worsening symptoms when other treatments fail. Multiple pregnancies and pelvic pain also contribute [26].

Heavier women faced more post-surgery problems like pain and bowel issues. Obesity complicates recovery, increasing infection and wound risks. Abdominal hysterectomies in these patients often see more bleeding and longer recoveries. Therefore, managing weight before surgery could significantly reduce complication risks [27].

We didn't see a clear link between pre-existing health issues and post-surgery problems [28]. Other studies have, especially with diabetes, high blood pressure, and heart disease, which can slow healing and raise infection risk [29]. Maybe our group of patients just didn't have enough severe cases to show a strong connection [30].

Many women in our study reported hot flashes, the classic menopausal symptom. These heat surges and sweating are due to hormone shifts. Though common, and often seen as a normal part of aging, few women seek treatment. They tend to endure them, even when these flashes impact their daily lives [31].

Many women after hysterectomy, regardless of type, experienced constipation. This is typical, caused by anesthesia, pain meds, and less movement. Abdominal surgery, affecting the bowels, worsens it. Opioid pain relief also contributes. Managing this constipation is key to making recovery more comfortable for patients [32].

Many women felt lethargic after their hysterectomies. This tiredness is normal, due to the body's stress from surgery. Removing ovaries can worsen it with hormonal changes. Fatigue hinders daily life [33]. Our study highlights the need for post-op care like physical therapy and good nutrition to combat this and improve recovery.

Women having abdominal hysterectomies reported more pain and swelling than those with other types. This more invasive surgery means bigger cuts, leading to more discomfort and longer healing. Good pain management, with medication and physical therapy, is crucial. While sometimes necessary, careful surgery and strong post-op care are key to reducing these problems [34].

We looked at how antibiotics were prescribed for different hysterectomy types. What we found was that everyone got the same standard antibiotic treatment, no matter what kind of hysterectomy they had. Giving preventative antibiotics is important, especially in surgeries like hysterectomies, to stop infections from developing afterward. Using the right antibiotics, at the right time, lowers the risk of diseases and helps patients recover better. By sticking to established guidelines, we can make sure the antibiotics are doing more good than harm, preventing infections while also trying to avoid creating antibiotic-resistant bacteria.

CONCLUSION

This study provides valuable insights into the impact of risk factors, surgical approaches, and antibiotic prophylaxis on postoperative complications in hysterectomy patients. Women aged 41–60 years were the most commonly affected group, primarily due to conditions like fibroids and endometriosis. Among the different hysterectomy types, laparoscopically assisted vaginal hysterectomy (LAVH) demonstrated fewer complications and faster recovery, while abdominal hysterectomy was associated with higher rates of pain, swelling, and bowel disturbances. Obesity (BMI >30) and pre-existing comorbidities such as diabetes and hypertension significantly contributed to postoperative complications, including prolonged recovery, increased pain, and surgical site infections (SSI). The most frequently reported postoperative symptoms were constipation (42%), lethargy (82%), and hot flashes (32%), particularly among menopausal women.

Our findings emphasize the need for personalized, risk-based antibiotic prophylaxis rather than a uniform approach, as all patients received the same standard antibiotic regimen regardless of hysterectomy type, leading to an SSI rate of 12%, particularly among high-risk. By incorporating these findings into clinical practice, healthcare providers can enhance surgical outcomes, improve patient recovery, and develop evidence-based guidelines for better postoperative management of hysterectomy patients.

Declarations

Conflict of Interest

The authors declare that they have no conflicts of interest related to this study.

Human Ethics and Consent to Participate

All procedures involving human participants complied with the ethical standards of the Institutional Review Board and the 1964 Declaration of Helsinki and its later amendments. Before participating in the study, all participants provided written informed consent.

Informed Consent

Informed consent was obtained from all individual participants included in the study, ensuring their voluntary participation.

Clinical Trial Registration

Clinical trial number: not applicable.

Funding

No funding was received for this study.

Availability of Data and Materials

The datasets used and/or analyzed during the current study are available from the corresponding author upon reasonable request.

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