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EVALUATING THE RELATIONSHIP BETWEEN SINUSITIS AND DIABETES (A CROSS-SECTIONAL STUDY IN IRAQ)

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Abstract: Background Diabetes is widely regarded as one of the most prevalent illnesses worldwide, owing to the increased susceptibility of diabetic patients to chronic infections that exacerbate the inflammatory aspects of sinus disease. Our study aimed to assess the impact of diabetes on sinusitis patients undergoing endoscopic sinus surgery. Patients and methods: A total of 143 patients with diabetes and sinusitis were recruited and treated in different hospitals in Iraq during the period from 16th June 2022 to 26th March 2023. This study described all clinical demographic characteristics, which included patients' ages between 30 and 60 years, gender, which included both men and women, disease indicators and antibiotics, which included medications used before surgery, as well as smoking factor. Endoscopic sinus surgery was performed on every diabetic patient as part of the clinical assessment, encompassing the duration of anaesthesia, the rate of blood transfusions during the operation, the length of stay in the hospital, and the postoperative follow-up of the patients, which included six months. All complications were identified, which had an impact on survival after the operation. Results Pre-operative clinical results also showed that women with diabetes were 58.62% more likely than men,

with the case rate reaching 41.38%. The clinical follow-up related to the patients' records after surgery was six months. Our study was identifying complications and mortality rates in patients following endoscopic sinus surgery, where the complication rate reached 40 cases out of the total, and the mortality rate in patients following sinus surgery reached 11.19%. Conclusion This study found less clinical improvement in the quality of life of diabetic patients after sinus surgery during a six-month clinical follow-up, with a patient complication rate of 27.97% and a patient mortality rate of 11.19%.

Key words: Sinusitis; Diabetes disease; Chronic infection; Allergic rhinitis; Nasal polyps; and SNOT-22.

Introduction

Diabetes mellitus was described as a metabolic disorder characterized by chronic hyperglycemia resulting from defects in insulin secretion or action, where further classifies diabetes into insulin-dependent diabetes mellitus (IDDM), non-insulin-dependent diabetes mellitus (NIDDM), and malnutrition-related diabetes mellitus (MRDM). [1-5]

that diabetes mellitus (DM) may have an impact on outcomes of endoscopic sinus surgery (ESS) where worse postoperative quality of life outcomes in DM patients with chronic rhinosinusitis (CRS). [6-8]

that DM was associated with different cultural outcomes and quality of life after functional endoscopic sinus surgery (FESS). It also analyzed the effect of DM on postoperative outcomes in ESS. [9-13]

Patients with DM did not have worse postoperative outcomes in the first six months after ESS, but the extent of surgical resection was a significant predictor of postoperative antibiotic or steroid use. [14-17]

Overall, DM may have an impact on the outcomes of sinus surgery, but the specific effects and implications are still not fully understood. [18]

It is necessary to conduct a proper assessment of the diabetic patient before surgery to make the required adjustments in the event of uncontrolled blood sugar, whether hypoglycemia or hyperglycemia [19]. The main risk factor for patients has been identified, which is developing unintentional hypoglycemia. Due to restricted fasting, often 8 to 12 hours before surgery, and maintenance of blood sugar medications. This has led to surgeons allowing surgeries to be performed in the context of hyperglycemia. Hyperglycemia has been shown to be a risk factor for the development of postoperative infections and cardiovascular complications, altering the immune response and producing a pro-inflammatory state in the perioperative period. [20]

Patients and methods

The paper reports a cross-sectional study investigating sinus infections in diabetic patients. A total of 143 individuals with diabetes and sinusitis were recruited and treated in different hospitals in Iraq between June 16th, 2022, and March 26th, 2023. This study presents the clinical and demographic details of the patients, including their age range of 30 to 60 years, gender (comprising both genders), disease indicators, antibiotics (such as medications taken before surgery), and smoking status. Additionally, the diagnostic procedures performed during the surgery included computed tomography using Lund-Mackay CT and SNOT-22 scores. This study

investigates clinical outcomes during diagnosis for diabetic patients, with a focus on the main bacterial risk factors affecting long-term patient health.

Additionally, it examines the results of endoscopic sinus surgery for these patients, including the duration of anesthesia (148.34 ± 55.11 minutes), the incidence of blood transfusions during surgery, the length of hospital stays, and the rate of post-surgery follow-up. Within six months post-surgery, our study assessed surgical outcomes in patients with diabetes.

We examined complications that impacted their postoperative survival rate and evaluated the severity of postoperative diabetic sinusitis using SNOT-22 during the six-month follow-up. This study identified the mortality rate for patients with diabetes following sinus surgery. A multivariable analysis was conducted to identify postoperative risk factors associated with mortality in diabetic patients during clinical follow-up.

Results

Table 1: Baseline demographic characteristics of diabetes patients.

Variables	**Number of patients, [143]**	**Percentage [%]**
Age		
30-39	30	20.69%
40-49	50	34.48%
50-60	65	44.83%
Sex		
Males	60	41.38%
Females	85	58.62%
Pre-operative indications		
Decreased sense of smell	5	3.45 %
Nasal congestion	7	4.83 %
Facial pain	8	5.52 %
Chronic infection	36	24.83 %
Asthma	25	17.24 %
Allergic rhinitis	26	17.93 %
Hematologic disorders	10	6.90 %
Nasal polyps	16	11.03 %

Gastroesophageal reflux disease	10	6.90 %
Smoking		
Yes	50	34.48%
No	95	65.52%
Pre-surgery antibiotics used		
Nasal rinse	96	66.21%
Steroid use	49	33.79%
Samter's triad	20	13.79%

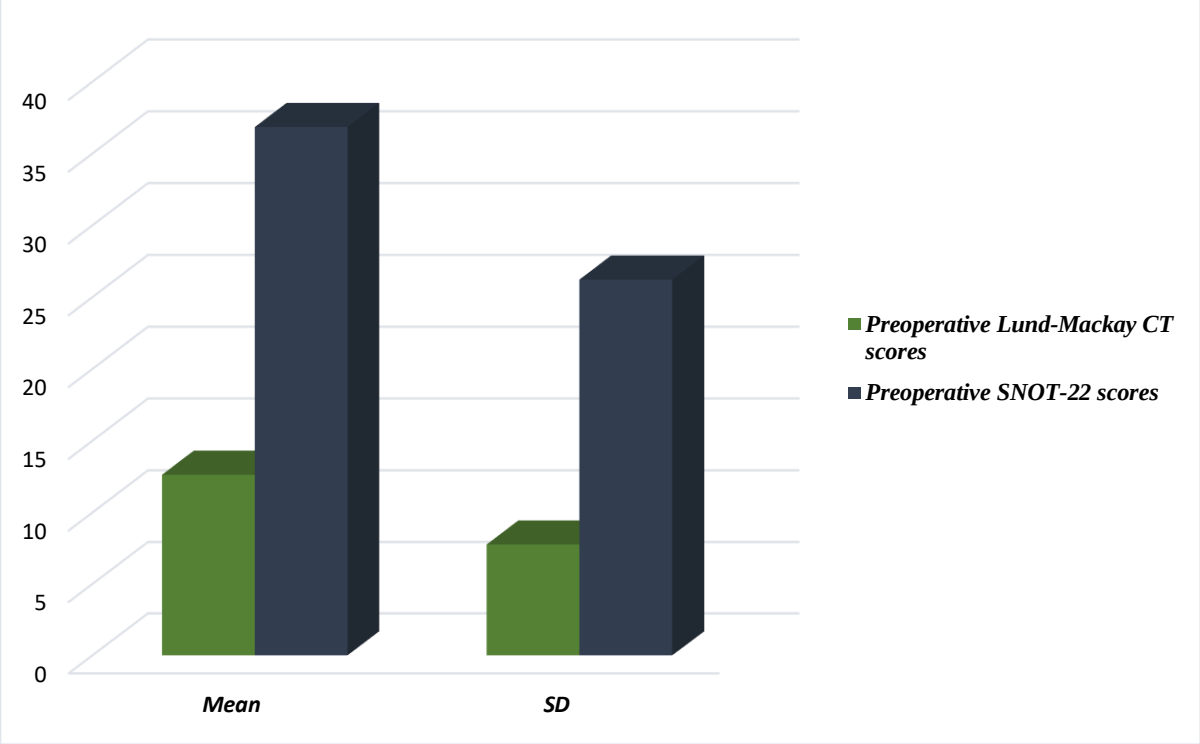


Figure 1: Identify pre-operative chronic rhinosinusitis severity for diabetes patients in terms of Lund-Mackay CT and SNOT-22 scores.

Table 2: Clinical outcomes related to Bacterium risk factors.

Variables	**Number of patients, [143]**	**Percentage [%]**
Anaerobes	5	3.45%
Staphylococcus aureus	8	5.52%
Pseudomonas aeruginosa	10	6.90%
Coagulase-negative staphylococcus	30	20.69%
Streptococcus pneumoniae	14	9.66%

Table 3: Intraoperative surgical outcomes.

Variables	***Patients' outcomes***
Post-operative follow-up, [months]	*5.1 ± 0.9*
Anesthesia time, [Minutes, mean ± SD]	*148.34 ± 55.11*
Length of stay in hospital after surgery, [Day, mean ± SD]	*7.137 ± 2.88*
Blood transfusion, N [%]	*14 [9.79%]*

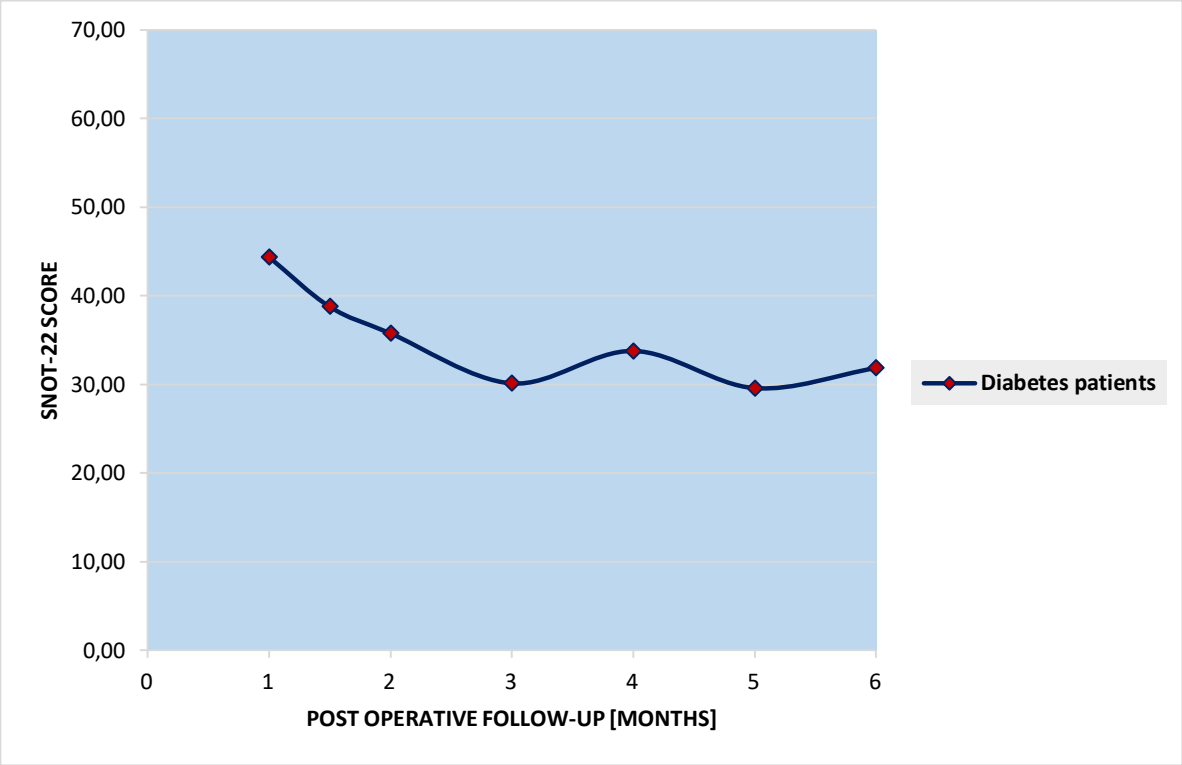


Figure 2: Assessment of severity of sinusitis for diabetes patients after surgery.

Table 4: Identifying complications and mortality rate in patients following endoscopic sinus surgery.

Complications	**Number of patients, [143]**	**Percentage [%]**
Complications		
Bleeding	10	6.99%
Infection	11	7.69%
Injury to the eye	4	2.80%
Cerebrospinal fluid leak	7	4.90%
Anosmia	8	5.59%
Total	**40**	**27.97%**

Mortality rate		
Yes	16	11.19%
No	127	88.81%

Table 5: Conducting postoperative multivariate analysis associated with risk factors for diabetes patients' mortality.

Variables	*OR (95% CI)*	*P-value*
Age	*1.186 [1.054-1.374]*	*0.00127*
Hematologic disorders	*1.901 [1.075-3.41]*	*0.02311*
Chronic infection	*1.883 [1.033-4.014]*	*0.0246*
Nasal polyps	*2.142 [1.457-3.15]*	*0.00176*
Allergic rhinitis	*2.90 [2.1-4.60]*	*0.00247*
Smoking	*1.22 [1.044-1.38]*	*0.0011*
Pseudomonas aeruginosa	*2.21 [2.01-4.88]*	*0.0024*
Streptococcus pneumoniae	*2.144 [1.44-3.085]*	*0.00166*
Coagulase-negative staphylococcus	*0.542 [0.332-0.82]*	*0.00352*
Bleeding	*2.140[1.40-3.09]*	*0.00172*

Discussion

The clinical outcomes of 143 diabetic patients who had undergone endoscopic sinus surgery were reviewed in this study. The study revealed that age was a major risk factor for patients, both pre-and post-surgery. Demographic analysis yielded these results. It was observed that the age group that underwent surgery, ranging from 50 to 60 years, had a higher incidence rate of 44.83%. Pre-operative clinical results revealed that women with diabetes were 58.62% more vulnerable than men, with a case rate of 41.38%. Our study identified indicators and factors linked to diabetic patients with chronic infection (24.83%), allergic rhinitis (17.93%), and nasal polyps (11.03%), alongside asthma (17.24%) and hematologic disorders (6.90%), being some of the most

influential risk factors. Smoking is deemed highly susceptible to sinusitis, which reduces the patient's resistance to the disease. This is particularly concerning as 34.48% of individuals are smokers.

In addition to medication, some patients used metformin (35%), and the rest used insulin. As for the antibiotics used, it was found that 66.21% of patients used nasal rinses, while others used steroids at a rate of 33.79%. This study was conducted to identify the preoperative severity of chronic rhinosinusitis in diabetic patients in terms of Lund-Mackay CT and SNOT-22 scores, as the disease evaluation using preoperative Lund-Mackay CT scores was (12.63±7.762), while the patients who were evaluated using preoperative SNOT- 22 scores was (36.84±26.21). In addition, this study identified the bacterial risk factors for sinus surgery in diabetic patients prior to surgery: Pseudomonas aeruginosa (6.90%), Coagulase negative Staphylococcus (20.69%), and Streptococcus pneumoniae (9.66%).

This trial looked at clinical outcomes during and after surgery. Clinical follow-up, based on patient records after surgery, was six months. Anesthesia was used during surgery (148.34 ± 55.11), and the percentage of patients who received blood transfusions was 9.79%. The length of hospital stay was 9.79%. Ten days. The severity of sinusitis after surgery was assessed during the post-operative follow-up using the SNOT-22 between (0 - 70), where the pain severity was relatively high at 44.38, but it decreased in the third month to 30.11, then the severity of sinusitis was estimated at 31.85. Identification of complications and mortality rate in patients after endoscopic sinus surgery, where the postoperative results showed that bleeding was 6.99%, infection 7.69%, where the complication rate reached 40 cases out of the total, and the mortality rate in patients after sinus surgery reached 11.19%. By multivariate analysis, the clinical results showed that age, chronic infection, nasal polyps, allergic rhinitis, haematological disorders, and coagulase-negative staphylococci were the most significant risk factors for patient survival.

According to recent studies, clinical outcomes where diabetes disease may be increased by sinusitis and other infections due to metabolic disorders, where most basic sites have more impact on patients with diabetes diseases were urinary tracts, such as staphylococcal follicular skin infections, fungal infections, and lower urinary tract infections. Some study discussed diabetes impact as associated with sinusitis, which it appears almost all patients with diabetes had significantly more likely to have P. aeruginosa and other coagulase-negative staphylococci. [21,22]

Due to British studies, clinical outcomes were presented significant largely in improvement of postoperative on female diabetes patients while less improvement of postoperative on male diabetes patients. However, diabetes patients suffering from sinusitis were more likely to have nasal polyps, gastroesophageal reflux disease, and allergic rhinitis. Similar to previous studies, our clinical results confirmed that patients with diabetes have a greater prevalence of gastroesophageal reflux disease. Also, recent studies determined that gastroesophageal reflux disease was one of the most common risk factors associated with diabetes patients who had neuropathy or nerve damage, which are common complications of diabetes. More research is needed to determine whether diabetes affects inflammation in the sinuses and nasal cavity, which could lead to the formation of nasal polyps. [23-25]

Using SNOT-22, another study assessed the level of pre-operative chronic sinusitis in diabetic patients and found that it was associated with a significantly increased risk of complications after surgery, which can affect patients' quality of life in the long term. [26]

Conclusion

Our results indicate that diabetes is an important factor influencing sinusitis, as diabetic patients suffer significantly from nasal polyps, allergic rhinitis, and gastroesophageal reflux. In addition, our study determined the severity of preoperative chronic sinusitis in diabetic patients using SNOT-22, which was associated with a significantly higher risk. Regarding postoperative outcomes, this study found less clinical improvement in the quality of life of patients after sinus surgery during clinical follow-up at six months, which made the patient complication rate reach 27.97%, while the patient mortality rate was 11.19%. Our results performed a multivariate analysis, which showed that nasal polyps, allergic rhinitis, haematological disorders, and coagulase-negative chronic infection were the most common risk factors for diabetic patients after sinus surgery, both in the short and long term.

This study recommends that most patients may need special clinical health care for longer than necessary to stay in the hospital after surgery, with more steroids and antibiotics. This study also highlighted the need for studies with longer follow-ups after surgery, more detailed diagnosis of sinus surgery patients, and longer evaluation of the effect of diabetes on postoperative sinusitis and its control in diagnosing patients with sinusitis.

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