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Incidence of post-operative nausea and vomiting in patients undergoing sleeve surgery with BMI> 35 and maintained with Propofol

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ABSTRACT

Background & aim of study: This study investigated the incidence of postoperative nausea and vomiting (PONV) in patients with a body mass index (BMI) greater than 35 who underwent sleeve surgery and were maintained with Propofol anesthesia. Postoperative nausea and vomiting (PONV) is a common complication following sleeve surgery, and Propofol is a commonly used anesthetic.
Material & method: In a prospective descriptive study, we used a non-randomized allocation strategy to allocate 55 patients who met the inclusion criteria. The patients were monitored for standard hemodynamic monitoring for blood pressure and heart rate was recorded prior to induction. The occurrence and severity of nausea and vomiting were recorded using a standardized scoring system. The inclusion criteria were American Society of Anesthesiologists (ASA) I, II, or III classification, BMI greater than 35, age between 18-45 years, and undergoing elective sleeve surgery. The exclusion criteria were ASA IV or V classification, BMI less than 35, and Patients with a known allergy to propofol. The researchers calculated the necessary sample size to be n = 58. Participants were selected using a convenience sampling method. The study ensured that the sample met the inclusion and exclusion criteria and that the sampling method was practical and feasible.
Results: The variables examined include age, gender, BMI, surgery duration, antiemetic medication, smoking, history of nausea and vomiting, and premedication. The study finds that there is a statistically significant differences in the number of patients with a history of motion sickness and a history of PONV between the two groups. Patients who had a history of motion sickness or PONV were more likely to experience PONV after surgery. However, there is no statistically significant differences in age, sex, smoking status, surgery duration, anesthesia duration, or fluid balance between the two groups (with or without PONV).
Conclusion: The study aimed to identify factors associated with the incidence of postoperative nausea and vomiting (PONV) through logistic regression analysis. The results indicated that there were no significant differences in age, sex, smoking status, surgery duration, anesthesia duration, or fluid balance between patients with and without postoperative nausea and vomiting (PONV). However, patients with a history of motion sickness or a history of PONV had significantly higher odds of experiencing PONV. The study suggests that preoperative assessment of patients for a history of motion sickness and PONV may be useful in identifying patients at higher risk for PONV and implementing preventative measures such as antiemetic medication. However, further research is needed to confirm these findings and explore additional factors that may contribute to the development of PONV.

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INTRODUCTION

Morbid obesity is a serious health problem that has been linked to numerous health complications, including cardiovascular disease, type 2 diabetes, sleep apnea, hypertension, and certain types of cancer. It is estimated that more than 600 million adults worldwide are affected by obesity, and this number is expected to continue to rise in the coming years (1, 2). Bariatric surgery is one of the most commonly performed surgical weight loss modalities to treat morbid obesity. The most commonly performed bariatric procedures include gastric bypass, sleeve gastrectomy, and adjustable gastric banding (3).

KEYWORDS:
postoperative nausea and vomiting,
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surgery outcomes,
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Propofol

Propofol is a widely used intravenous anesthetic agent in the field of anesthesia due to its favorable pharmacological properties. It is a short-acting sedative-hypnotic agent that produces rapid onset of anesthesia, allowing for the induction of unconsciousness within seconds. The duration of anesthesia with propofol is relatively short, which makes it an excellent choice for short and intermediate surgical procedures, such as sleeve gastrectomy (4, 5).

Aim of the study

To determine and record all post-operative nausea and vomiting incidence in patients undergoing sleeve surgery.

MATERIAL & METHOD

In this prospective descriptive study, a cohort of patients undergoing sleeve surgery was enrolled. All participants were classified according to the American Society of Anesthesiologists (ASA) physical status classification system as ASA I, II, or III and had a body mass index (BMI) >35. Preoperatively, all patients received midazolam (0.2 mg/kg) and fentanyl (1 mcg/kg) for premedication. General anesthesia was induced with 2 mg/kg of propofol and 0.4-0.5 mg/kg of atracurium, and maintained with propofol. Standard hemodynamic monitoring for blood pressure and heart rate was recorded prior to induction. In the post-anesthesia care unit (PACU), patients were evaluated for the incidence of nausea and vomiting upon arrival and 6 hours after surgery. In this past clinical trial, eligible patients who met the inclusion criteria were assigned to treatment groups using the nonrandomized sequentially numbered opaque sealed envelopes (SNOSE) method. This method was chosen as it is a widely accepted technique for maintaining allocation concealment in clinical studies.

Sample size

The incidence of postoperative nausea and vomiting is an important outcome measure in surgical procedures, as it can significantly impact patient recovery and satisfaction in this study, the sample size was calculated using formula 1, which takes into account several key factors, including the risk of incorrect rejecting a zero hypothesis, the prevalence of complications, and the margin of error.

The risk of incorrect rejecting a zero hypothesis, also known as the alpha level, is a measure of the likelihood of concluding that a treatment effect exists when, in fact, there is no real effect. In this study, an alpha level of 0.05 was selected, which corresponds to a 5% chance of making this type of error.

Data collection

In this prospective descriptive study, we aim to investigate the potential predictors for post-operative nausea and vomiting by collecting data from patient medical documents. The study had been recorded several key variables including age, gender, BMI, preoperative nausea and vomiting history, anesthesia and surgical time. These variables were analyzed to determine their relationship to the occurrence of post-operative nausea and vomiting. One of the benefits of using medical documents as a data source is that it can provide a cost-effective and efficient method of gathering information on patient history and outcomes.

Measurement

In this study, certain variables such as age, gender, and BMI has been collected by hospital staff as part of routine care and has been recorded in the medical documents of each participant.

Statistical analysis

This study utilized the IBM SPSS version 26 software to perform statistical analyses. Descriptive statistics including frequency, percentage, mean, and standard deviation were employed to summarize the collected data. The study aimed to investigate the relationship between demographic and clinical characteristics of the study population and the incidence of post-operative nausea and vomiting (PONV).

RESULTS

In table 1 we compare the variables between two groups to investigate if there are any significant differences between the two groups. By comparing the variables, we determine if there are any factors that may be associated with the outcome of interest, in this case, PONV. This information can be used to identify potential risk factors for PONV and to develop strategies to reduce its incidence. Additionally, comparing the variables between two groups can help us understand the characteristics of the patient population and how they may influence the outcome of interest.

Table 1: distribution of the variables reported by PONV status and total

Variable		Without PNOV N=48 (82.76%)	With PNOV N=10 (17.24%)	Total 58 (100%)	P-Value
Age		33.71±7.97	36.42± 7.28	34.18±7.86	0.325
Sex	male	33.33%	40%	20(34.5%)	0.687
	female	32 (66.67)	6 (60.00)	38 (65.5)	
BMI		40.77±2.38	41.51±2.03	40.89±2.32	0.363
Smoking		16 (33.33)	5 (50.00)	21 (36.21)	0.318
History of motion sickness		7 (14.58)	7 (70.00)	14 (24.14)	<0.001
History of PONV		3 (6.25)	6 (60.00)	9 (15.52)	<0.001

Surgery duration (min)	73.33±20.24	70.00±28.28	72.75±21.58	0.661
Anesthesia duration (min)	87.70± 19.37	88.00±27.80	87.76±20.78	0.968
Fluid balance (mL)	2312.5±455.98	2430.0±547.82	2332.75±469.93	0.476

After conducting a logistic regression analysis, several variables were found to be associated with the incidence of PONV. The odds ratios and 95% confidence intervals for the variables age, sex, smoking, history of motion sickness, history of PONV, surgery duration, anesthesia duration, and fluid balance, along with their associated p-values.

The odds ratio for age was 1.04 (95% CI 0.96-1.14), indicating that there was no significant difference in the odds of having PONV between patients with different ages (p=0.321). The odds ratio for sex was 0.75 (95% CI 0.18-3.04), indicating that there was no significant difference in the odds of having PONV between male and female patients (p=0.687). The odds ratio for smoking was 2.00 (95% CI 0.50-7.93), indicating that patients who smoked had twice the odds of experiencing PONV compared to non-smokers, but this difference was not statistically significant (p=0.324) The logistic regression analysis was performed on a dataset consisting of 58 observations to examine the relationship between the predictor variable "body_mass_index" and the binary outcome variable " PONV." The results indicate that the model does not significantly deviate from the null hypothesis, as evidenced by a LR chi-square value of 0.88 (p = 0.3480). The log likelihood of the model is -26.22, and the pseudo R-squared value is 0.0165. Regarding the predictor variable, "body_mass_index," the odds ratio is estimated to be 1.16 with a standard error of 0.19. However, the odds ratio is not statistically significant (z = 0.92, p = 0.360), suggesting that there is no strong evidence of an association between body mass index and the binary outcome variable. The 95% confidence interval for the odds ratio ranges from 0.85 to 1.59. These scientific findings provide insights into the logistic regression analysis and its implications for the relationship between body mass index and the binary outcome variable.

The odds ratio for a history of motion sickness was 13.66 (95% CI 2.84-65.83), indicating that patients with a history of motion sickness had over 13 times the odds of experiencing PONV compared to patients without a history of motion sickness (p<0.001).

The odds ratio for a history of PONV was 22.50 (95% CI 4.02-125.94), indicating that patients with a history of PONV had over 22 times the odds of experiencing PONV compared to patients without a history of PONV (p<0.001). The odds ratios for surgery duration, anesthesia duration, and fluid balance were 0.99 (95% CI 0.96-1.02), 1.01 (95% CI 0.97-1.03), and 1.01 (95% CI 0.99-1.01), respectively. These results suggest that there were no significant differences in the odds of experiencing PONV based on the duration of surgery or anesthesia or the amount of fluid balance (p-values > 0.05).

Based on the results of a multivariable logistic regression analysis, several variables were found to be significantly associated with the incidence of postoperative nausea and vomiting (PONV). After adjusting for other factors showed the odds of PONV for a history of motion sickness was 11.14 (95% CI 1.75-70.94), indicating that patients with a history of motion sickness, adjusted with history of PONV had over 11.14 times the odds of experiencing PONV compared to patients without a history of motion sickness (p=0.011). In addition, the odds of PONV for patients with history of PONV was 18.24 (95% CI 2.49-133.41), indicating that patients with a history of PONV, adjusted with history in motion sickness had 18.24 times the odds of experiencing PONV compared to patients without a history of PONV (p=0.004).

Table 2: logistic regression between the PNOV and associated factors

	Univariable			Multivariable		
Variable	Odds Ratio	95% confidence interval	P-value	Odds Ratio	95% confidence interval	P-value
Age	1.04	0.96-1.14	0.321	-	-	-
Sex	0.75	0.18-3.04	0.687	-	-	-
BMI	1.16	(0.85, 1.59)	0.360	-	-	-
Smoking	2.00	0.50-7.93	0.324	-	-	-
History of motion sickness	13.66	2.84,65.83	0.001	11.14	1.75-70.94	0.011
History of PONV	22.50	4.02-125.94	<0.001	18.24	2.49-133.41	0.004
Surgery duration (min)	0.99	0.96-1.02	0.655	-	-	-
Anesthesia duration (min)	1.01	0.97-1.03	0.968	-	-	-
Fluid balance (mL)	1.01	0.99-1.01	0.470	-	-	-

DISCUSSION

The aim of a study to investigate the incidence and associated factors of PONV in patients undergoing sleeve surgery with BMI>35 is important for several reasons.

Firstly, patients with obesity are known to be at a higher risk of developing PONV due to several factors, such as an increased sensitivity to anesthetic agents, higher levels of anxiety and stress, and altered hormonal and metabolic states. Therefore, understanding the incidence and risk factors for PONV in this specific patient population can help healthcare providers to develop targeted strategies for prevention and management.

Secondly, sleeve surgery is a common bariatric procedure that is often used to treat obesity and its associated comorbidities. However, PONV is a common complication of this surgery, and it can significantly impact patient outcomes and satisfaction. Therefore, identifying the factors that contribute to PONV in patients undergoing sleeve surgery with BMI>35 can help to optimize patient care and improve surgical outcomes.

Overall, this study can help to improve our understanding of PONV in patients with obesity who are undergoing sleeve surgery, and it can inform the development of effective prevention and management strategies to improve patient outcomes.

Age

Our results showed the mean age of patients with PONV (36.43 years) was slightly higher than that of patients without PONV (33.71 years). The standard deviation for both groups indicates that the age distribution was relatively spread out in both groups.

One possible interpretation of this result is that age could be a potential risk factor for PONV. The slight difference in mean age between the two groups could suggest that as patients get older, they may be more likely to experience PONV. However, this interpretation is limited by the fact that the age range for both groups is relatively wide, and the difference in mean age is not large.

Gender

Our result reported among patients without PONV, 33.33% were male and 66.67% were female. Among patients who did experience PONV, 40% were male and 60% were female. This result suggests that gender could be a potential risk factor for PONV, with females being more likely to experience PONV than males. This finding is consistent with previous studies that have identified female gender as a risk factor for PONV.

BMI

While our analysis of the data revealed that there were no significant differences in body mass index (BMI) between two distinct groups in some of pervious studies showed significant association. The non-significant association may be due to low sample size of our study.

Multiple studies have investigated the association between BMI and PONV, yielding conflicting outcomes. While some investigations have reported a positive correlation between higher BMI and an increased incidence of PONV, others have found no statistically significant association.

Smoking: Our results showed among patients without PONV, 66.67% reported not smoking, while 33.33% reported smoking. This result suggests that smoking status could be a potential risk factor for PONV, with patients who non-smoke being more likely to experience PONV than smokers. However, this interpretation is limited by the fact that the study did not provide information on the frequency or duration of smoking, which could affect the strength of the association.

History of motion sickness: Our result showed among patients with and without postoperative nausea and vomiting (PONV). Among patients without PONV, 81.25% reported no history of motion sickness, while 18.75% reported a history of motion sickness. In contrast, among patients with PONV, 30% reported no history of motion sickness, and 70% reported a history of motion sickness. This finding is consistent with previous studies that have identified a history of motion sickness.

History of PONV: Also, our results sowed in the 58 participants, 48 (82.76%) reported no history of PONV and 10 (17.24%) reported a history of PONV. Among those without PONV, 93.75% reported no history of PONV, while 6.25% reported a history of PONV. Also, among patients with PONV, 60% reported a history of PONV, and 40% reported no history of PONV.

These findings suggest that a history of PONV may be a risk factor for future PONV, with patients who have a history of PONV being more likely to experience PONV again. This result is consistent with previous studies that have identified a history of PONV as a significant risk factor for future PONV.

surgery duration: our results showed mean of surgery duration patients without PNOV, there were 48 observations with a mean of 73.33, a standard deviation of 20.25, a minimum of 30, and a maximum of 110. For patients with PNOV, there were 10 observations with a mean of 70, a standard deviation of 28.28, a minimum of 30, and a maximum of 110.

The mean surgery duration for patients without PNOV was slightly longer than that of patients with PNOV, but the difference was not statistically significant based on our results. The standard deviation for surgery duration was higher for patients with PNOV than for those without PNOV, suggesting that there was more variability in surgery duration among patients who experienced PNOV. Previous studies have identified surgery duration as a risk factor for PNOV, with longer surgery durations being associated with a higher risk of PNOV.

Fluid balance: Fluid balance during surgery for patients with and without PONV. The mean fluid balance during surgery was 2312.5 ml (standard deviation = 455.9885 ml) for patients without PONV, while the mean fluid balance for patients with PONV was 2430 ml (standard deviation = 547.824 ml).

Fluid balance during surgery refers to the amount of fluid that a patient receives during surgery and the amount of fluid that is eliminated from the body. Fluid management during surgery is important for maintaining optimal organ perfusion and reducing the risk of complications such as PONV. PONV can be caused by several factors, including the administration of anesthesia and fluids during surgery.

The given result suggests that patients who experienced PONV had a slightly higher mean fluid balance during surgery than those who did not experience PONV. However, the difference in mean fluid balance between the two groups was not large and was not statistically significant based on the given information.

Previous studies have reported conflicting results regarding the relationship between fluid balance during surgery and the development of PONV. Some studies have suggested that higher fluid volumes during surgery may increase the risk of PONV, while others have found no association between fluid balance and PONV (6,7).

CONCLUSION

In conclusion, this study aimed to compare the characteristics

and surgical outcomes of patients with and without postoperative nausea and vomiting (PONV). The results indicate that there were no significant differences in age, sex, smoking status, surgery duration, anesthesia duration, or fluid balance between the two groups. However, the group with PONV medication had a significantly higher percentage of patients with a history of motion sickness and a history of PONV compared to the group without PONV medication.

These findings suggest that preoperative assessment of patients for a history of motion sickness and PONV may be useful in identifying patients at higher risk for PONV and implementing preventative measures such as antiemetic medication. Further research is needed to confirm these findings and explore additional factors that may contribute to the development of PONV.

Ethical approval

The study's ethical approval (IR.TUMS.SPH.REC.1401.305) was approved by the Tehran University of Medical Sciences' ethical committee. For all the information that was acquired, group data were published (instead of individual data). The required data lacks any identity information, such as a name, ID number, country code, or other identifier.

CONFLICT OF INTEREST

This study is not associated with any conflicts of interest, as reported by its authors.

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