Original Article/*Özgün Araştırma*

doi: 10.54875/jarss.2024.19491

The Effect of Preoperative State-Trait Anxiety Level and Anesthesia Technique on Postoperative Nausea and Vomiting

Preoperatif Durumluk-Sürekli Anksiyete Düzeyi ve Uygulanan Anestezi Tekniğinin Postoperatif Bulantı ve Kusmaya Etkisi

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ABSTRACT

Objective: It was aimed to determine the effect of preoperative anxiety levels and anesthesia of the patients on postoperative nausea and vomiting (PONV).

Methods: This study was a cross sectional research. It was conducted with 323 patients at a state hospital between April-June 2022. Data were collected with Sociodemographic and Clinical Characteristics Form, State-Trait Anxiety Inventory (STAI), and Rhodes Index of Nausea, Vomiting, and Retching. Descriptive statistics were applied to analyze the data.

Results: The mean age of the patients were 50.5 ± 17.3 years, and 18.9% of them were treated in the general surgery ward. There was a significant difference in the development of PONV in the Trait Anxiety Inventory (STAI-T) severe anxiety group compared to the mild anxiety group (p=0.031) and in the State Anxiety Inventory (STAI-S) moderate anxiety group compared to the mild anxiety group (p=0.012). When anesthetic type was included in the model, there was a significant difference in the development of PONV between the STAI-S moderate and mild anxiety groups (p=0.006). State Anxiety Inventory scores were found to be effective in the group that received general and spinal anesthesia (p=0.013). Postoperative nausea and vomiting development was 41.2% in the moderate anxiety group and 21.7% in the mild anxiety group in the general and spinal anesthesia group.

Conclusion: It was determined that undergoing general or spinal anesthesia increases the risk of developing PONV as the STAI-S score increases.

Keywords: Surgery, anxiety, nausea, vomiting

ÖZ

Amaç: Hastaların ameliyat öncesi anksiyete düzeyleri ve anestezinin ameliyat sonrası bulantı ve kusma (PONV) üzerine etkisinin belirlenmesi amaçlanmıştır.

Yöntem: Bu çalışma kesitsel bir araştırmadır. Nisan-Haziran 2022 tarihleri arasında bir devlet hastanesinde 323 hasta ile yürütülmüştür. Veriler Sosyodemografik ve Klinik Özellikler Formu, Durumluk-Sürekli Kaygı Envanteri (STAI) ve Rhodes Bulantı, Kusma ve Öğürme İndeksi ile toplandı. Verileri analiz etmek için tanımlayıcı istatistikler uygulanmıştır.

Bulgular: Hastaların yaş ortalaması 50,5 ± 17,3 yıldı ve %18,9'u genel cerrahi servisinde tedavi edilmişti. Sürekli Kaygı Envanteri (STAI-T) şiddetli anksiyete grubunda, hafif anksiyete grubuna göre (p=0,031) ve Durumluk Kaygı Envanteri (STAI-S) orta anksiyete grubunda hafif anksiyete grubuna göre (p=0,012) PONV gelişiminde anlamlı fark vardı. Anestezi tipi modele dahil edildiğinde STAI-S orta anksiyete grubunda hafif anksiyete grubuna kıyasla PONV gelişiminde anlamlı bir fark bulunmuştur (p=0,006). Durumluk Kaygı Envanteri skorları genel ve spinal anestezi alan grupta etkili bulunmuştur (p=0,013). Genel ve spinal anestezi grubunda PONV gelişimi orta anksiyete grubunda %41,2, hafif anksiyete grubunda %21,7 olarak saptanmıştır.

Sonuç: Genel veya spinal anestezi uygulanmasının STAI-S skoru arttıkça PONV gelişme riskini artırdığı belirlenmiştir.

Anahtar sözcükler: Cerrahi, anksiyete, bulantı, kusma

INTRODUCTION

The surgical process, which may cause great changes in patients, is one of the troublesome events for most patients. Anxiety is defined as a situation in which there is an expectation of a threat in the future. Preoperative anxiety is seen in 60% to 80% of patients (1,2). Preoperative anxiety negatively affects the consequences of the surgery. These negative consequences of preoperative anxiety include postoperative pain, increased fear of pain, increased need for analgesics,

Received/Geliş tarihi : 10.05.2023
Accepted/Kabul tarihi : 07.09.2023
Publication date : 31.01.2024

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Cite as: Soyer Er O, Erkan HN. The effect of preoperative state-trait anxiety level and anesthesia technique on postoperative nausea and vomiting. JARSS 2024;32(1):53-61.

increased postoperative delirium, prolonged hospitalization, and decreased quality of life and recovery (3-6). In addition to these negative consequences, anxiety has been found to contribute to other postoperative problems such as nausea, vomiting, tachycardia, hypertension, and increased risk of infection. Therefore, preoperative anxiety may be a predictable risk factor for postoperative nausea and vomiting (7,8).

Postoperative nausea and vomiting (PONV) is a problem that negatively affects the patient. The risk of PONV is 20-30%, and this rate increases to 70-80% when prophylaxis is not applied to the patient. Postoperative nausea and vomiting is defined as any nausea or vomiting that, occurs within the first 24-48 hours, in the patients postoperatively. Nausea is defined as a feeling of discomfort in the stomach, and vomiting is defined as the expulsion of stomach contents. Postoperative nausea and vomiting carry a risk of serious complications such as wound dehiscence, aspiration, pneumonia, fluid electrolyte imbalance, and increased intracranial pressure (9-12).

Intervention according to perioperative risk classification and risk level is very important for PONV. Evaluation of risk factors for PONV should be used to guide PONV management. Healthcare workers should be aware of these risks and these risky situations should be reduced as much as possible. It was stated that perioperative anxiety should be reduced in order not to cause PONV. Studies have indicated that preoperative anxiety is a triggering factor for PONV. However, there is also a study in the literature showing that anxiety is not effective, it is recommended to investigate its effect, and published guidelines state that the effect of anxiety on PONV has limited clinical value. There is also no consensus on the risk factors for PONV (8,9,13-17). Therefore, in this study, it was aimed to determine the effect of preoperative anxiety and secondarily anesthesia type on the development of PONV. For this aim, the hypotheses of the study were as follows.

H0: Preoperative anxiety had no effect on PONV in relation to the type of anesthesia.

H1: Preoperative anxiety had an effect on PONV in relation to the type of anesthesia.

MATERIALS and METHODS

Study Design and Sample

This study was a cross-sectional research approved by Non-Clinical Interventional Research Ethics Committee of a university (2022/197). Written permission (E-40043106-604.01.02) was obtained from the Provincial Health Directorate of a province. This study was conducted between April 20-June 30, 2022. Before the application, the patients were informed about the purpose of the study and how it would be conducted, and their written consent was obtained. The study was conducted by the principles of the Declaration of Helsinki.

In determining the sample size, power analysis was performed using the GPower 1.3.9.2 program based on the PONV incidence rate (30%) of a similar study by Gan et al. (9). According to the results of the analysis, the significance level as α=0.05 (5%), the effect size was taken as d=0.5, and the sample size calculated for a power level of 1-β=0.95 was 323. The study included patients who volunteered to participate in the study, were older than 18 years of age, and were scheduled for elective surgery. Patients who did not volunteer to participate in the study, who were younger than 18 years of age, and who underwent emergency or unplanned surgery were excluded.

Procedures and Data Collection

Daily visits were made by the researchers to collect the data. The patients who were planned to be elective were determined in the surgery list. “Sociodemographic and Clinical Characteristics Form and State-Trait Anxiety Inventory” were applied within the first 24 hours before the surgery after the admission of the patients to the ward. The type of anesthesia administered was read from the operation report. “Rhodes Index of Nausea, Vomiting, and Retching” was applied 24 hours after the operation when the patient was available. Data were collected face to face. Data collection forms were answered in approximately 10 minutes on average.

Sociodemographic and Clinical Characteristics Form

This form aimed to determine the sociodemographic and clinical characteristics of the patients and was prepared by the researchers in line with the literature (9). In this form, there are 25 items in total with open-ended and closed-ended question types that include sociodemographic information about patients such as age, gender, marital status, education status, employment status, and social security. Clinical features, and clinical characteristics, including the surgical ward at which he/she was treated, previous hospitalizations, and previous surgery.

State-Trait Anxiety Inventory

The State-Trait Anxiety Inventory (STAI) was developed by Spielberger et al. Adopted for the Turkish society by Öner & Le Compte (18,19). In the inventory, there are a total of 40 items in a 4-point Likert format, 20 of which are State Anxiety Inventory (STAI-S) and 20 are from Trait Anxiety Inventory (STAI-T). The State Anxiety Inventory is evaluated according to the feelings of the individual at a certain moment and situation with the statements of “1) not at all”, “2) somewhat”, “3) moderately so”, “4) very much so”, STAI-T is evaluated according to how the individual usually feels with the statements

of "1) almost never", "2) sometimes", "3) often", "4) almost always". Direct statements describe negative emotions, and reverse statements describe positive emotions. Items 1, 2, 5, 8, 10, 11, 15, 16, 19, and 20 are reverse items for STAI-S, and items 21, 26, 27, 30, 33, 36 and 39 for STAI-T. A constant of 50 is added to the total score to calculate the STAI-S score, and 35 for STAI-T. The total score obtained from both scales ranges from 20 to 80. A total score of 0-19 indicates no anxiety, 20-39 indicates mild anxiety, 40-59 indicates moderate anxiety, and 60-79 indicates severe anxiety (18,19). Cronbach's alpha values were found to be 0.929 for STAI-S and 0.845 for STAI-T.

Rhodes Index of Nausea, Vomiting, and Retching

The scale developed by Rhodes and McDaniel (20) was adapted into Turkish by Genç (21). In this scale, the number of nausea, vomiting, and retching of individuals and their distress are measured by Likert type assessment. This five-point Likert-type scale consists of eight items that measure the number and severity of nausea, vomiting, and retching in the last 24 hours. For each response, "never vomited" is scored as "0" or "never felt it", "7 or more" "severe" "more than 6 hours" "too much" is scored as 4. Items 1, 3, 6, and 7 must be reversed to score the Rhodes Index of Nausea, Vomiting, and Retching. The highest value that can be obtained from the scale is 32, meaning that as the score increases, the level of distress also increases. The scale has three subscales: symptom (nausea, vomiting, and retching) experience, occurrence, and distress. In determining PONV, symptom experience responses are considered. The experience of nausea (items 4, 5, 7), the experience of vomiting (items 1, 3, 6) all add up to the PONV experience. The experience of retching (items 2, 8) is not included in PONV (21). Cronbach's alpha value was found to be 0.968.

Data Analysis

Statistical Package for Social Sciences (SPSS) for Windows 25.0 package program was used in the analysis of the data. The sociodemographic characteristics of the patients were determined by frequency, percentage distribution, mean, and standard deviation values. Whether the data fit the normal distribution was evaluated with the Kolmogorov–Smirnov Test. Independent two-sample t-test and ANOVA were used to determine the difference in PONV mean scores between the groups according to sociodemographic and clinical variables. The relationship between the STAI and the Rhodes Nausea, Vomiting, and Retching Index sub-dimensions was determined by Pearson correlation analysis. Logistic regression analysis was used to determine the effect of anxiety levels on nausea and vomiting. A p value less than 0.05 was considered statistically significant in all results ($p<0.05$).

RESULTS

The mean age of the patients was 50.01 ± 16.85, and 65.6% were under 60 years old. Among the patients, 50.5% were male, 74.6% were married, 37.5% lived in the city center, 59.8% had a high school education or less, and 88.5% received social security. The general surgery ward serviced 18.9% of patients, while 36.9% had chronic conditions and 38.4% were overweight. Out of the patients, 36.5% smoked, 8.0% consumed alcohol, and 23.5% used medications on a regular basis. Of the patients, 64.7% had previously been hospitalized, 42.1% underwent surgery, and 43.7% had experienced PONV. Forty seven point seven percent of patients expressed concern about their upcoming surgery, 29.7% of them experienced motion sickness, and 51.7% of patients underwent surgery under general anesthesia. According to the STAI-S, 83.0% and according to the STAI-T, 90.0% of the patients had moderate anxiety (Table I).

A statistically significant difference was found between the mean the total nausea and vomiting experience scores, the anesthesia, STAI-S, and STAIT-T groups and patients' age, education level, living place, ward, chronic disease, smoking, regular drug use, previous hospitalization and surgery, previous surgery and PONV experience and alternative practice in the previous surgery, and motion sickness ($p<0.05$) (Table II).

There was a very weak negative correlation between the STAI-S anxiety score and PONV distress (r=-.131), PONV occurrence (r=-.151), and PONV experience (r=-.145) scores. There was a weak positive correlation between STAI-T anxiety score and PONV distress (r=.179), PONV occurrence (r=.185), and PONV experience (r=.185) scores. There was a very high positive correlation between PONV experience scores and PONV distress (r=.977) and PONV occurrence (r=.945) (Table III).

The effects of only preoperative anxiety levels (Model I), preoperative anxiety levels and anesthesia type (Model II), preoperative anxiety levels, anesthesia type and sociodemographic characteristics (age and gender) (Model III) were shown on the development of PONV of the patients by logistic regression model (Table IV).

When only the effect of preoperative anxiety on PONV was evaluated according to Model I, the development of PONV increased 0.448 times in patients in the STAI-S moderate anxiety group compared to the mild anxiety group (p=0.12). In the STAI-T classification, there was no significant relationship between the development of PONV in the moderate anxiety group compared to the group with mild anxiety (p=.562) however, there was a significant relationship in terms of PONV development in the severe anxiety group (p=.028). The risk was 8.579 times higher in the severe STAI-T group (Table IV).

Table I: Participant Demographics (n=323)

	n	%[a]
Age *(x̄± SD=50.01±16.85)*		
<60 age	212	65.6
≥60 age	111	34.4
Gender		
Female	160	49.5
Male	163	50.5
Marital Status		
Married	241	74.6
Single	82	25.4
Living place		
City	121	37.5
Town	120	37.2
Village	82	25.4
Education		
High school lower	193	59.8
High school or higher	130	40.2
Social Security		
Yes	286	88.5
No	37	11.5
Surgical Ward		
General Surgery	61	18.9
Orthopedics	56	17.3
Urology	49	15.2
Neurosurgery	47	14.6
Plastic surgery	46	14.2
Cardiovascular Surgery	36	11.1
Ear Nose Throat-Eye Surgery	28	8.7
Chronic Disease		
Yes	87	36.9
No	236	73.1
Body Mass Index *(x̄± SD=27.28±4.61)*		
Weak	4	1.2
Normal	105	32.5
Overweight	124	38.4
Fat	90	27.9
Smoking		
Yes	118	36.5
No	205	63.5
Drinking Alcohol		
Yes	26	8.0
No	297	92.0
Medication Use Regularly		
Yes	76	23.5
No	247	76.5
Previous Hospitalization Experience		
Yes	209	64.7
No	114	35.3
Previous Surgery Experience		
Yes	135	42.1
No	188	57.9
Previous PONV Experience (n=135)		
Yes	59	43.7
No	76	56.3
Surgery Concern for Current Surgery		
Yes	154	47.7
No	169	52.3
Motion Sickness		
Yes	96	29.7
No	227	70.3
Type of Anesthesia		
General anesthesia	167	51.7
Spinal anesthesia	105	32.5
Local anesthesia	51	15.8
STAI-S		
Mild Anxiety	55	17.0
Moderate Anxiety	268	83.0
STAI-T		
Mild Anxiety	11	3.4
Moderate Anxiety	297	92.0
Severe Anxiety	15	4.6

Note: x̄±SD = mean±standard deviation, [a]Percentages are based on n. **PONV:** Postoperative Nausea and Vomiting; **STAI-S:** State Trait Anxiety Inventory-State, **STAI-T:** State-Trait Anxiety Inventory-Trait.

Table II: The Total Nausea and Vomiting Experience Mean Scores Between Groups According to Sociodemographic and Clinical Variables (n=323)

	Total nausea and vomiting experience scores	p
	x̄ ± SD	
Age		
< 60 years	3.34±4.34	t=–4.19; **p<.001**
≥ 60 years	5.68±4.95	
Gender		
Female	4.43±4.80	t=1.062; p=0.289
Male	3.87±4.57	
Education		
High school lower	5.29±4.92	t=5.860; **p<.001**
High school or higher	2.46±3.73	
Marital Status		
Married	4.23±4.74	t=-.529 p=0.597
Single	3.91±4.54	
Social Security		
Yes	4.27±4,66	t=1.328 p=0.185
No	3.18±4.80	
Living place		
City	3.25±4.08	F=3.687; **p=0.026**
Town	4.56±4.94	
Village	4.86±4.97	
Surgical Ward		
General Surgery	3.67±4.52	F=3.298; **p=0.004**
Orthopedics	4.96±5.25	
Urology	4.36±4.60	
Neurosurgery	4.93±4.67	
Plastic surgery	1.97±3.68	
Cardiovascular Surgery	5.80±5.08	
Ear Nose Throat-Eye Surgery	3.32±3.74	
Body Mass Index		
Underweight	6.25±4.50	F=1.742; p=0.158
Normal weight	3.82±4.92	
Overweight	3.74±4.45	
Obesity	5.00±4.66	
Chronic Disease		
Yes	5.49±5.05	t=2.991; **p=0.003**
No	3.65±4.45	
Smoking		
Yes	3.37±4.40	t=-2.333; **p=0.020**
No	4.60±4.80	
Drinking Alcohol		
Yes	3.30±4.36	t=-.957; p=0.339
No	4.22±4.71	
Medication Use Regularly		
Yes	5.96±5.05	t=3.668; **p<.001**
No	3.59±4.43	
Previous Hospitalization Experience		
Yes	5.05±4.94	t=5.305; **p<.001**
No	2.49±3.65	
Previous Surgery Experience		
Yes	5.43±4.94	t=4.206; **p<.001**
No	3.21±4.27	
Previous PONV Experience (n=135)		
Yes	6.47±5.13	t=2.101; **p=0.038**
No	4.69±4.66	
Surgery Concern for Current Surgery		
Yes	5.77±4.91	t=6.238; **p<.001**
No	2.66±3.93	
Alternative Therapy for Previous PONV (n=135)		
Yes	7.39±5.37	t=2.302; **p=0.023**
No	5.01±4.71	
Motion Sickness		
Yes	5.16±4.86	t=2.551; **p=0.011**
No	3.72±4.55	
Type of Anesthesia		
General anesthesia	5.08±4.80	F = 24.437; **p<.001**
Spinal anesthesia	4.55±4.66	
Local anesthesia	0.25±0.89	
STAI-S		
Mild Anxiety	5.65±4.92	t=2.633; **p=0.009**
Moderate Anxiety	3.84±4.58	
STAI-T		
Mild Anxiety	4.00±4.95	F=10.151; **p< .001**
Moderate Anxiety	3.89±4.55	
Severe Anxiety	9.33±4.33	

Note: x̄±SD = mean±standard deviation.
PONV: Postoperative Nausea and Vomiting, **STAI-S:** State-Trait Anxiety Inventory-State, **STAI-T:** State-Trait Anxiety Inventory-Trait.

Table III: Correlation matrix for State-Trait Anxiety Inventory and Sub-dimensions of Rhodes Scale

	STAI-S	STAI-T	PONV Distress	PONV Occurrence	PONV Experience
STAI-S	1				
STAI-T	.020	1			
PONV Distress	-.131*	.179**	1		
PONV Occurrence	-.151**	.185**	.993**	1	
PONV Experience	-.145**	.185**	.977**	.945**	1

****:** Correlation is significant at the 0.01 level (2-tailed). ***:** Correlation is significant at the 0.05 level (2-tailed). **PONV:** Postoperative Nausea and Vomiting; **STAI-S**: State-trait anxiety inventory-state; **STAI- T:** State-trait anxiety inventory-trait.

Table IV: Logistic Regression Analysis of Variables Affecting Postoperative Nausea and Vomiting According to Different Models

	β	Df	Wald	p	Exp (B)/OR, (%95,CI)
Model I: Effects of only preoperative anxiety levels					
STAI-S (Mild Anxiety*)					
Moderate Anxiety	-.802	1	6.293	**.012**	.448 (.239-.839)
STAI-T (Mild Anxiety*)					
Moderate Anxiety	.364	1	.336	.562	1.439 (.421-4.925)
Severe Anxiety	2.149	1	4.799	**.028**	8.579 (1.254-58.687)
Cox & Snell R Square= 0.044; Nagelkerke R Square=0.059					
Model II: Effects of preoperative anxiety levels and anesthesia type					
ANESTHESIA TYPE (Local*)					
General Spinal **STAI-S** (Mild Anxiety*)	3.149 3.011	1 1	30.817 26.753	**<0.001** **<0.001**	23.318 (7.638-71.186) 20.298 (6.487-63.517)
Moderate Anxiety	-1.006	1	7.448	**.006**	.366 (.178-.753)
STAI-T (Mild Anxiety*)					
Moderate Anxiety	-.072	1	.280	.597	1.149 (.687-1.920)
Severe Anxiety	1.664	1	2.240	.134	5.278 (.598-46.616)
Cox & Snell R Square= 0.201; Nagelkerke R Square=0.268					
Model III: Preoperative anxiety levels, anesthesia type and sociodemographic characteristics					
AGE (<60 age*) ≥ 60 age	3.166	1	6.890	**<0.001**	23.723 (7.688-73.202)
GENDER (Male*) Female	-.238	1	0.877	.349	.788 (.479-1.297)
ANESTHESIA TYPE (Local*)					
General Spinal **STAI-S** (Mild Anxiety*)	3.149 3.011	1 1	30.817 20.298	**<0.001** **<0.001**	23.318 (7.638-71.186) 20.298 (6.487-63.517)
Moderate Anxiety	-.977	1	6.904	**.009**	.376 (.182-.780)
STAI-T (Mild Anxiety*)					
Moderate Anxiety	-.284	1	.140	.708	.752 (.170-3.335)
Severe Anxiety	1.441	1	1.711	.191	4.224 (.488-36.576)
Cox & Snell R Square= 0.221; Nagelkerke R Square=0.295					
* Reference Category					

In Model II, the effects of preoperative anxiety levels and anesthesia types on PONV were evaluated. The risk of PONV was 23,318 times higher in the general anesthesia group and 20,298 times higher in the spinal anesthesia group compared to the local anesthesia group. While STAI-T anxiety levels had no effect on the development of PONV, among the STAI-T anxiety levels, the risk of developing PONV was 0.366 times higher in the moderate anxiety group compared to the mild anxiety group (p=0.006) (Table IV).

In Model III, preoperative anxiety levels, anesthesia type, age and gender were included in the model together. In this model, the risk of PONV increased 23,318 times and 20,298 times in the general anesthesia group compared to the local anesthesia group (p<0.001). While anxiety levels had no effect on the development of PONV, among the STAI-S anxiety levels, the risk of developing PONV in the moderate anxiety group was 0.376 times higher compared to the mild anxiety group (p=0.006). There was no difference in the risk of PONV between men and women. It was determined that the risk of PONV increased 23,723 times in the 60 and older group compared to the group under 60 years of age (p<0.001) (Table IV).

PONV developed in 53.6% of the patients. According to the result of the CHAID analysis; anesthesia type was determined to be effective in the development of PONV (p<0.001). The incidence of PONV was 62.1% in the general anesthesia and spinal anesthesia group, and 7.8% in the local anesthesia group. STAI-S scores were found to be effective in the group that received general and spinal anesthesia (p=.013). Postoperative nausea and vomiting development was 58.8% in the moderate anxiety group and 78.3% in the mild anxiety group in the general and spinal anesthesia group. PONV development was higher in the mild anxiety group compared to the STAI-S moderate anxiety group in the general and spinal anesthesia group (Figure 1).

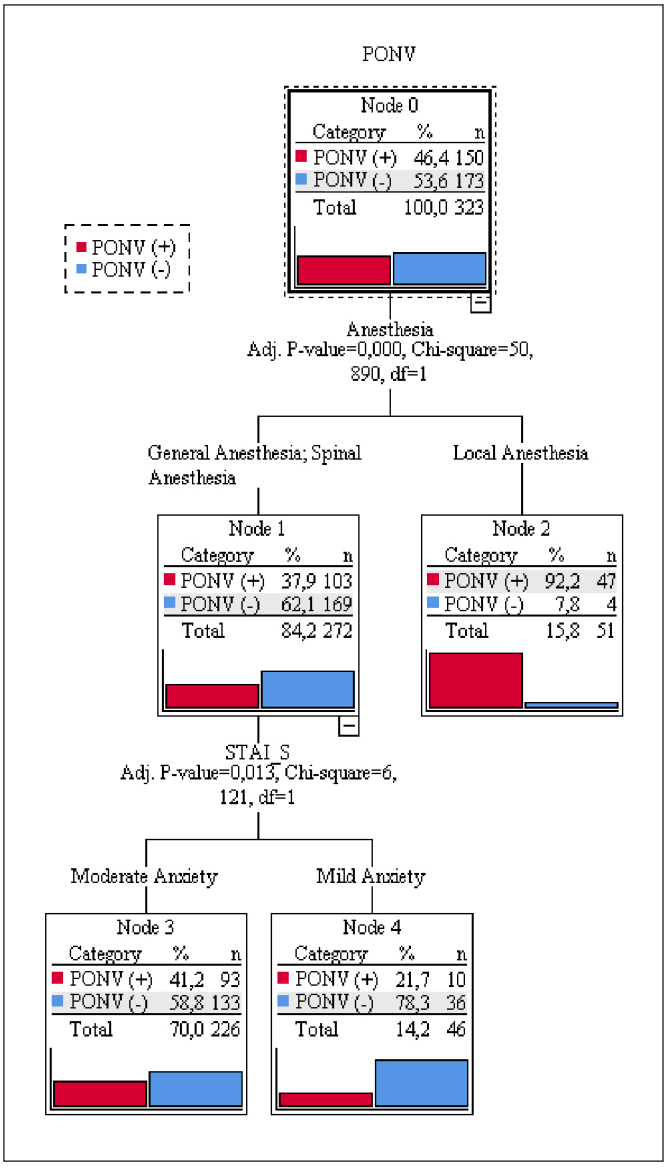

Figure 1: Tree diagram for variables affecting postoperative nausea and vomiting.

DISCUSSION

Unlike studies examining preoperative anxiety as a determinant of PONV (15,16), this study examined the effects of preoperative anxiety levels and and intraoperative anesthesia type on PONV experience in patients. Anxiety can also be classified as a trait and state anxiety. The State-Trait Anxiety Inventory, which measures anxiety, is a validated instrument that assesses these two aspects of anxiety. First, state anxiety refers to the stimuli that trigger anxiety in the person's immediate environment. On the contrary, trait anxiety is understood as personal factors that affect the perception of the anxiety level of stimuli. State Anxiety Inventory measures the anxiety state that can change depending on the stress of a particular moment, while STAI-T measures the anxiety trait that reflects the personality tendency of the person. Studies have reported that the patients experience moderate anxiety according to the STAI-S and STAI-T scores in the preoperative period (2,19,22,23). In parallel with the literature, it was found in this study that patients experienced moderate anxiety in the preoperative period. As it is known, deciding on surgery causes anxiety in the individual. It is thought that preoperative anxiety is expected to be at a moderate level in this patient group.

It has been shown that high preoperative anxiety level is associated with the development of PONV (24). However, in these studies, it is not known whether there is a difference in anxiety levels. In a study, a significant correlation was found between preoperative state anxiety (p=0.001, r=0.60) and

trait anxiety (p=0.001, r=0.54) and PONV. In another study, it was stated that the evidence for a link between preoperative anxiety and PONV was weak (15). In this study, preoperative STAI-S and STAI-T levels were found to be effective in the development of PONV when anesthesia types were not included in the model. It was determined that this level of anxiety, which may develop due to surgery and personality traits, affects PONV. According to the CHAID analysis, PONV developed in almost all of the groups that received general and spinal anesthesia. Again, in this study, it was determined that STAI-S levels, depending on the operation status, were effective in the development of PONV in the group receiving general and spinal anesthesia. The incidence of PONV in the patients was 53.6%, while it was 62.1% in the patients who received general and spinal anesthesia. The incidence of PONV increased in patients with mild anxiety levels compared to the moderate anxiety group. In a study, it was found that the ward where the patient was treated and the type of anesthesia were effective factors in experiencing of nausea, vomiting, and retching, and in parallel with these, it was found to be high in patients who had cardiovascular system surgery (25). When the effects of spinal and general anesthesia on the development of PONV were compared, it was determined that general anesthesia was a risk factor.

Preoperative anxiety in patients causes adverse effects that lead to physiological and psychological complications after surgery. Postoperative nausea and vomiting are two of these troubling complications. In one study, patients described PONV as a worse experience than postoperative pain. It was determined that half of the patients experienced less nausea and vomiting within 6 hours after the surgery (1,26,27). In another study, PONV was detected in approximately half of the patients within the first 24 hours after surgery (8). Apfel et al. identified four factors that significantly increase the risk of PONV. These factors were female gender, history of motion sickness, non-smoking, and opioid use. About half of the women and smokers developed PONV, and another study reported, that young men and non-smokers were the most at-risk gru-oup for PONV. While alcohol use was found to predispose to PONV, no relationship was found between smoking and PONV (24, 28-30). In this study, when the factors affecting nausea and vomiting were evaluated, being 60 years old and over, having undergone major surgery, having a low education level, living in a village, having a chronic disease, not smoking, being hospitalized before, and having surgery, stating that they were worried about the surgery, receiving general anesthesia, having PONV in his/her previous surgery, and those having motion sickness with nausea and vomiting were identified as risk factors for PONV. It has been reported that high BMI increases the likelihood of PONV (31). In this study, no significant relationship was found between BMI and PONV. Type of surgery has been suggested to be a risk factor for PONV, but there is insufficient evidence. Laparoscopic, gynecological surgery, and cholecystectomy have been reported to be risk factors that increase PONV (11).

The limitations of the study include the unplanned discharge of the patients or their re-admission to the operating room or intensive care unit due to deterioration in their general condition, and the patients' refusal to participate in the study.

CONCLUSION

As a result, while there was no significant difference in terms of PONV experience according to the state anxiety groups that triggered anxiety in the immediate environment, there was a significant difference in the development of PONV compared to the trait anxiety groups in which personal factors were effective. Personal characteristics are an important risk factor for the development of anxiety. Patients at risk should be identified, appropriate preoperative anxiety management should be applied, and PONV prophylaxis should be considered when anxiety sensitivity is high. In addition, if the patient knows the type of anesthesia will be administered in the preoperative period, anesthesia types will also have an effect on preoperative anxiety. Studies show that data and practices in this area are insufficient and more scientific research is needed to achieve better patient outcomes.

AUTHOR CONTRIBUTIONS

Conception or design of the work: OSE
Data collection: HNE
Data analysis and interpretation: OSE
Drafting the article: OSE, HNE
Critical revision of the article: OSE, HNE
Other (study supervision, fundings, materials, etc): OSE
The author (OSE, HNE) reviewed the results and approved the final version of the manuscript.

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