Original Article

Cukurova Anestezi ve Cerrahi Bilimler Dergisi

Evaluation of the Relationship Between Preoperative Anxiety Level and Complete Blood Count Parameters and American Society of Anesthesiologists Score

Bilal Atilla Bezen[1], *Sudenaz Solak*[2], *İbrahim Yıldırım*[2], *Yaprak Poyraz*[2], *Seray Akca*[2], *Rahime Yalçın*[2], *Zeynep Kürkçü*[2], *Seray Kuşpınar*[2], *Ecesu Orak*[2], *Şerife Arı*[2], *Tuna Tavas*[2], *Uğur Korak*[2], *Özge Taşköprü*[2]

[1] Department of Anesthesiology and Reanimation, Faculty of Medicine, Afyonkarahisar Health Sciences University, Afyonkarahisar, Türkiye
[2] Medical Student, Faculty of Medicine, Afyonkarahisar Health Sciences University, Afyonkarahisar, Türkiye

***Correspondence:** Bilal Atilla Bezen, MD; drbilalatilla@gmail.com

Abstract

Objective: This study aimed to investigate the relationship between preoperative anxiety scores, ASA physical status scores, and complete blood count parameters. **Materials and Methods:** This clinical study included adult patients aged 18–70 scheduled for elective surgery. Demographic data, clinical characteristics, planned procedure duration, and ASA classification were recorded. Preoperative anxiety levels were assessed in the preoperative waiting area using a standardized anxiety scale. Hematological parameters were obtained from hospital records. Appropriate statistical tests were used based on data distribution. **Results:** A total of 118 patients were enrolled. Patients with higher anxiety levels had significantly longer planned procedure durations and lower ASA scores. ($p<0.05$, for both) Postoperative recovery time was also prolonged in patients with elevated anxiety. ($p<0.05$) Among hematological parameters, only white blood cell values differed significantly between anxiety groups ($p<0.05$), while other parameters showed no meaningful differences. **Conclusion:** Preoperative anxiety was associated with ASA classification, anticipated surgical duration, and recovery time. Proper evaluation and management of anxiety may contribute to a safer and more predictable surgical process.

Keywords: Preoperative anxiety; surgery; ASA score; blood parameters; recovery time

1. Introduction

Preoperative anxiety is defined as a feeling of worry, fear, and uneasiness experienced by patients prior to surgery. It may arise from concerns related to uncertainty, pain, anesthesia-related risks, possible surgical complications, or the postoperative recovery process. While the prevalence of anxiety in daily life is approximately 10–20%, it has been reported to increase up to 80% in the preoperative period[1]. This is of particular importance, as elevated preoperative anxiety levels have been associated with postoperative complications[2]. Factors such as literacy level, marital status, and parental status have also been shown to influence preoperative anxiety.

The American Society of Anesthesiologists (ASA) Physical Status Classification System is widely used to evaluate patients' general health status and anesthesia-related risks

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prior to surgery. ASA I represents completely healthy individuals without any known systemic disease, whereas ASA II includes patients with well-controlled systemic diseases. Patients with uncontrolled systemic illnesses are classified as ASA III[3].

One of the most used methods for evaluating anxiety in preoperative patients is the State-Trait Anxiety Inventory (STAI). The State Anxiety Scale (STAI-S) assesses momentary anxiety levels brought on by situational stresses like surgery, while the Trait Anxiety Scale (STAI-T) assesses a person's overall inclination toward anxiety[4]. Several studies have reported that higher ASA scores are associated with increased levels of anxiety[5]. Although multiple factors contribute to the development of anxiety, its relationship with preoperative complete blood count (CBC) parameters remains an area of interest that has not been thoroughly explored. Therefore, in this study, we aimed to investigate the relationship between preoperative anxiety scores, ASA physical status scores, and CBC parameters.

2. Materials and Methods

This clinical study was conducted after obtaining approval from the Institutional Ethics Committee of Afyonkarahisar Health Sciences University (Decision No: 459, Date: 03.12.2024). Every procedure involving human subjects was carried out in compliance with the Declaration of Helsinki (2013) and its subsequent revisions. Written and verbal informed consent was obtained from all participants prior to inclusion.

Data collection took place at the Afyonkarahisar Health Sciences University Medical Faculty Hospital's operating rooms over a one-month period (04 December 2024–04 January 2025), focusing on elective surgical patients. Patients aged 18–70 years who were willing and able to respond to survey questions, and who had no history of neurological or psy-chiatric disorders or related medication use, were included. Exclusion criteria included patients younger than 18 or older than 70 years, emergency or local anesthesia cases, re-fusal to complete questionnaires, and history of neurological or psychiatric disorders.

Demographic and clinical data including age, sex, height, weight, literacy level, mar-ital status, type of surgery, ASA classification, and type of anesthesia were obtained in the preoperative waiting area. The STAI-S questionnaire was administered to assess preoper-ative anxiety level. Hematological parameters were retrieved from hospital electronic medical records. Postoperative recovery times were obtained from anesthesia follow-up forms.

The STAI consists of 40 items divided into two 20-item subscales. Each item is scored on a 4-point Likert scale (1 = Not at all, 4 = Very much so), yielding subscale scores between 20 and 80. Low anxiety was defined as 20–37, moderate anxiety as 38–44, and high anxiety as ≥45[6]. The STAI-S component was used to gauge state-dependent anxiety related to the approaching surgical procedure.

Statistical Analysis

Statistical analyses were performed using IBM SPSS Statistics for Windows, version 29.0. Categorical variables were expressed as frequency (n) and percentage (%). Continu-ous variables were expressed as mean, standard deviation, median, and minimum–max-imum values. Normality was assessed using the Kolmogorov–Smirnov test, skewness–kurtosis values, and histograms. The Kruskal–Wallis test was used when normality as-sumptions were not met, and one-way ANOVA when satisfied. Post hoc Tukey test or Mann–Whitney U test were applied when significant differences were identified. Cate-gorical variables were compared using the Chi-square test. A p-value <0.05 was consid-ered statistically significant.

3. Results

A total of 118 patients were included, of whom 65 (55.1%) were female and 53 (44.9%) were male. According to STAI-S scores, 30 (25.4%) were classified as low anxiety, 50 (42.4%) as moderate anxiety, and 38 (32.2%) as high anxiety.

There were no statistically significant differences between anxiety groups in terms of age, sex, height, body weight, BMI, marital status, surgical specialty, educational status, or anesthesia type ($p > 0.05$). However, planned procedure duration differed significantly across groups; post hoc analysis revealed that the high-anxiety group had significantly longer planned procedure times compared with the low-anxiety group ($p = 0.003$). ASA scores also differed significantly across anxiety groups ($p = 0.007$) (Table 1).

Table 1. Comparison of demographic data and clinical characteristics according to anxiety levels

Parameters	Low STAI-S (n=30)	Moderate STAI-S (n=50)	High STAI-S (n=38)	p
Age (year)	43.97±16.23	42.26±13.97	42.63±16.38	0.887*
Gender (female) n (%)	11 (36.7)	30 (60.0)	24 (63.2)	0.061†
Height (cm)	164 (145–176)	162.5 (150–189)	169.5 (150–183)	0.108‡
Weight (kg)	74.30±12.63	75.06±12.91	76.68±15.56	0.759*
BMI (kg/m^2)	27.80±5.28	27.86±5.13	27.38±5.43	0.906*
Marital Status (married) n (%)	28 (93.3)	40 (80.0)	29 (76.3)	0.165†
Planned Surgery Duration (min)	60 (15–180)	60 (15–240)	77.5 (45–300)	0.003‡a
ASA Scores: 1 n (%)	5 (16.7)	11 (22.0)	20 (52.6)	0.007†
ASA Scores: 2 n (%)	23 (76.7)	33 (66.0)	16 (42.1)	
ASA Scores: 3 n (%)	2 (6.7)	6 (12.0)	2 (5.3)	
Anesthesia: Sedation n (%)	9 (30.0)	11 (22.0)	3 (7.9)	0.051†
Anesthesia: Spinal n (%)	12 (40.0)	21 (42.0)	15 (39.5)	
Anesthesia: General n (%)	4 (13.3)	9 (18.0)	16 (42.1)	

** One-way ANOVA; † Pearson Chi-square test; ‡ Kruskal–Wallis test. a Post-hoc Mann–Whitney U: High STAI > Low STAI, p=0.003.*

Among hemogram parameters, a statistically significant difference was observed only in WBC values ($p = 0.036$). Post hoc Tukey analysis indicated that this difference resulted from the low-STAI group having significantly higher WBC counts compared with the moderate-STAI group ($p = 0.039$). No significant differences were found for remaining hemogram parameters ($p > 0.05$). Initial vital signs remained consistent across all groups ($p > 0.05$). Recovery time differed significantly among groups ($p = 0.009$); the high-anxiety group had significantly longer recovery compared with the moderate-anxiety group ($p = 0.010$) (Table 2).

Table 2. Comparison of preoperative hemogram parameters and vital signs according to anxiety levels

Parameters	Low STAI-S (n=30)	Moderate STAI-S (n=50)	High STAI-S (n=38)	p
WBC (×10^3)	10.08±3.08	8.64±2.45	8.77±2.04	0.036*a
Neut (×10^3)	6.41 (2.58–14.24)	6.56 (3.26–13.06)	7.45 (3.56–12.15)	0.145‡
Lymphocyte (×10^3)	2.18±0.78	1.96±0.73	1.94±1.03	0.433*
RBC	4.45±0.57	4.65±0.57	4.57±0.60	0.329*
Hemoglobin	12.58±2.11	13.30±1.83	12.99±2.84	0.394*
HCT	38.65±5.82	40.58±5.22	39.71±5.23	0.302*
MCV	86.47±7.48	87.30±4.97	87.70±6.56	0.715*
PLT (×10^3)	260 (127–386)	244.5 (151–534)	246.5 (128–490)	0.995‡
MPV	10.74±0.88	10.73±1.03	10.82±1.10	0.909*
NLR	3.25 (0.85–9.98)	3.20 (1.43–17.18)	3.70 (1.70–16.42)	0.186‡
PLR	122.95 (48.78–404.35)	126.55 (44.13–458.00)	131.87 (52.22–685.71)	0.430‡
Systolic BP (mmHg)	135.5±16.11	139.70±17.80	138.58±16.36	0.558*
Diastolic BP (mmHg)	80 (50–100)	81.5 (50–108)	82 (60–96)	0.335‡
Pulse (per min)	89.5 (53–107)	90 (65–118)	94 (78–128)	0.078‡
SpO_2 (%)	98 (94–100)	97 (93–100)	97 (88–99)	0.178‡
Recovery Time (min)§	9.5 (5–11)	9 (6–16)	12 (6–17)	0.009‡a
Hospital Stay (day)	2 (1–6)	2 (1–10)	2 (1–28)	0.210‡

** One-way ANOVA; *a Post-hoc Tukey: Low STAI–Moderate STAI, p=0.039; Low STAI–High STAI, p=0.086. ‡ Kruskal–Wallis; ‡a Post-hoc Mann–Whitney U: High STAI > Moderate STAI, p=0.010; Low STAI–Moderate STAI, p=0.075. § Analyses performed after excluding patients who received spinal anesthesia.*

Correlation analysis demonstrated a moderate positive correlation between STAI-S scores and planned procedure duration ($r = 0.376$, $p < 0.001$), a weak positive correlation

with recovery time (r = 0.308, p = 0.009), and a weak negative correlation with ASA scores (r = –0.274, p = 0.003). No significant correlation was found between planned procedure duration and recovery time (p > 0.05) (Table 3).

Table 3. Correlation of parameters not following a normal distribution (Spearman correlation analysis)

Parameters	STAI-S Scores	ASA Scores	Planned Surgery Duration (min)	Recovery Time
STAI-S Scores r	1.000			
STAI-S Scores p	—			
ASA Scores r	–.274**	1.000		
ASA Scores p	0.003	—		
Planned Surgery Duration r	.376**	–0.139	1.000	
Planned Surgery Duration p	0.000	0.133	—	
Recovery Time r	.308**	–0.096	.129	1.000
Recovery Time p	0.009	0.428	0.288	—

*** Correlation is significant at the 0.01 level (2-tailed).*

4. Discussion

In our study, grouping patients according to preoperative anxiety levels measured by STAI-S revealed significant differences in ASA scores among the groups. Patients with lower ASA scores were more frequently represented in the high-anxiety group. Furthermore, a positive relationship was observed between planned procedure duration and anxiety levels, and postoperative recovery time was prolonged in patients with elevated preoperative anxiety. Previous studies support the relevance of these findings. Yadav et al. reported that demographic variables, including ASA classification, were comparable across groups, but the psychological impact of surgery could vary significantly despite these classifications[7]. Similarly, Götz et al. emphasized the importance of assessing preoperative anxiety, noting that anxiety levels could influence surgical outcomes and recovery processes[8].

Investigations into the relationship between preoperative anxiety and ASA scores have suggested a complex interplay between a patient's physical and psychological status. Acharya et al. found no significant difference in anxiety levels between ASA I and ASA II patients[9], whereas Chandra et al. reported that ASA I patients exhibited significantly higher anxiety scores compared to ASA II patients, proposing a potential inverse relationship between these variables[10]. Consistent with these reports, our study also observed higher anxiety levels among patients with lower ASA scores.

Recent evidence suggests that anxiety may be associated with hematological and inflammatory markers. Yurteri and Şahin demonstrated significant alterations in systemic inflammation-related hemogram parameters in children and adolescents with generalized anxiety disorder[11]. Karatı et al. reported a positive correlation between elevated procalcitonin levels and anxiety disorders[12]. Neutrophil-to-lymphocyte ratio (NLR) and platelet-to-lymphocyte ratio (PLR) have also been studied in this context. Özyurt and Binici found marked inflammatory responses in adolescents with obsessive-compulsive disorder and comorbid anxiety[13], while Yaseen et al. reported significant elevations in proinflammatory cytokines in participants with anxiety[14]. In our study, the significant difference observed in WBC counts aligns with this literature; however, no significant differences were found in NLR, PLR, neutrophil, or lymphocyte counts among the anxiety groups.

Beyond inflammatory markers, other hemogram parameters including RDW and MPV have also been implicated in anxiety disorders[15]. Maron and Nutt highlighted the potential of hemogram-derived biomarkers to contribute to understanding and managing generalized anxiety disorder[16].

There are a number of limitations to this study. The results' generalizability was limited because it was carried out at a single location with a small sample size. Heterogeneity

in surgical specialties and procedure complexity, as well as variations in patients' psychological and surgical histories, may have influenced the results. Differences in preoperative information delivery across surgical departments could also affect anxiety levels. Furthermore, WBC levels may be influenced by several factors such as smoking status, recent infections, and steroid use, which should be considered when interpreting the findings.

5. Conclusion

The study demonstrated that preoperative anxiety levels can have significant effects on various clinical parameters related to the surgical process. Higher anxiety levels, as measured by STAI-S, were associated with lower ASA scores and prolonged postoperative recovery time. Additionally, a positive relationship was observed between planned procedure duration and anxiety scores. Among hemogram parameters, only WBC levels showed a significant difference across anxiety groups. Assessing preoperative anxiety and intervening when necessary may contribute to a more predictable, safe, and comfortable surgical process. Larger, multicenter studies are warranted to further elucidate the effects of anxiety on surgical outcomes and potential biomarkers.

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Ethical Approval: The study was approved by Afyonkarahisar Health Sciences University Noninterventional Clinical Research Ethical Committee (Decision No: 459, Date: 03.12.2024). The study was conducted in accordance with the Declaration of Helsinki.

Informed Consent: Written and verbal informed consent was obtained from all participants prior to their inclusion in the study.

Conflict of Interest: The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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