

Anxiety level and risk factors among pediatric patients in endoscopic procedures outside the operating room: A cross-sectional study

Pediatric hastalarda ameliyathane dışı endoskopik işlemlerde anksiyete seviyesi ve risk faktörleri: Kesitsel çalışma

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Abstract

Aim: Endoscopy under anesthesia creates stress and anxiety in children and their parents. In this study, we aimed to determine the preoperative anxiety levels of parents and patients who were routinely informed before endoscopy and examine the relationship between children and parents' state and trait anxiety levels.

Methods: A cross-sectional study was planned in which pediatric patients and parents were included. The study comprised 104 ASA I-II patients, aged 6-14 years, who were scheduled for endoscopy under deep sedation, and their parents. Immediately after the child patient was taken to the treatment room, parents were asked to fill out the State-Trait Anxiety Inventory. The demographic characteristics of the patients were recorded. The children's anxiety level immediately after separation from parents was evaluated with Modified Yale Preoperative Anxiety Scale (m-YPAS). The patients were divided into two groups according to anxiety levels. Those with m-YPAS >30 were considered the anxiety (+) group, m-YPAS ≤30 were defined as the anxiety (-) group.

Results: The mean age of the patients was 11.8 (2.6) years (6-14). Twenty-nine patients had m-YPAS > 30, and 75 patients had m-YPAS ≤30. Parent anxiety levels were not significantly different between the two groups. There was a strong negative correlation ($r=-0.589$, $P<0.001$) between child's anxiety and child age, a negative moderate correlation between child's anxiety and parent age ($r=-0.259$, $P=0.008$), and weak positive correlation between child's anxiety and complications ($r=0.218$, $P=0.026$). Young age was determined as an independent risk factor for increased child anxiety (OR: 0.501, $P<0.001$, 95% CI: 0.390-0.643).

Conclusion: There is no relationship between preoperative anxiety in school-age children and parental anxiety. Young age is an independent risk factor for the development of anxiety in the child.

Keywords: Anxiety, m-YPAS, Parent anxiety, STAI

Öz

Amaç: Anestezi altında gerçekleştirilen endoskopi işlemi çocuklarda ve ebeveynlerinde stres ve kaygı yaratır. Bu çalışmada Endoskopi işlemi öncesi rutin bilgilendirilme yapılan ebeveynlerin ve hastaların preoperatif kaygı düzeylerini belirlemek ve çocuklar ile ebeveynlerin durum-sürekli kaygıları arasındaki ilişkiyi incelemeyi amaçladık.

Yöntemler: Çocuk hasta ve ebeveynlerin dahil edildiği kesitsel bir çalışma planlandı. Çalışmaya derin sedasyon altında endoskopi planlanan 6-14 yaş arası, ASA I-II, 104 çocuk hasta ve ebeveynleri dahil edildi. Çocuk hasta işlem odasına alındıktan hemen sonra ebeveynlerden Durum-Sürekli Kaygı Anketini doldurmaları istendi. Hastaların demografik özellikleri kayıt edildi. Çocukların kaygı seviyesi ebeveynlerinden ayrıldıktan hemen sonra Modifiye Yale Preoperatif Kaygı Skoru (m-YPAS) ile değerlendirildi. Hastalar anksiyete düzeylerine göre iki gruba ayrıldı. m-YPAS >30 anksiyet (+) grup, m-YPAS ≤30 anksiyet (-) grup olarak belirlendi.

Bulgular: Hastaların yaş ortalaması 11,8 (2,6) (6-14) yılıdır. 29 hasta da m-YPAS >30, 75 hasta da m-YPAS ≤30'dur. Ebeveyn kaygı seviyeleri iki grup arasında istatistiksel olarak anlamlı değildi. Çocuk kaygısı ile çocuk yaşı arasında kuvvetli ($r=-0,589$, $P<0,001$), ebeveyn yaşı arasında negatif yönde orta ($r=-0,259$, $P=0,008$), komplikasyon arasında pozitif yönde düşük ($r=0,218$, $P=0,026$) korelasyon vardı. Çocuk kaygı seviyesi için düşük çocuk yaşı bağımsız risk faktörü olarak belirlendi. (OR: 0,501, $P<0,001$, 95% CI: 0,390-0,643).

Sonuç: Okul çağı çocuklarda preoperatif kaygı ile ebeveyn kaygı arasında etkileşim yoktur. Küçük yaş, çocukta kaygı gelişimi için bağımsız risk faktörüdür.

Anahtar kelimeler: Kaygı, m-YPAS, Ebeveyn kaygı, STAI

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Introduction

Endoscopy is a diagnostic and treatment tool used by pediatric gastroenterologists to detect underlying organic pathologies in diseases of the gastrointestinal tract in the pediatric population. Endoscopy is usually performed under general anesthesia or deep sedation in children [1]. Medical procedures such as endoscopy can be a negative experience for children. Not only the child undergoing endoscopy, but the whole family can experience stress and anxiety [2]. The most common subject of anxiety among patients and parents are "Pain" and "Endoscopy-related accidents," respectively, before the procedure. The difficulty both patients and parents experience before and after the procedure regards "Hunger." By explaining these specific concerns, it is possible to reduce the anxiety of both patients and parents before endoscopy [3].

In addition, research has shown that the child's social compatibility, cognitive ability, temperament (sociability and activity) and age are predictors of preoperative anxiety [4,5]. Age and cognitive maturation are the most important predictors of preoperative anxiety in children [5]. In the preschool group, parents' anxiety level is higher. There is a close relationship with preoperative anxiety between preschool children and parents [6]. The presence of a close correlation between the periprocedural anxiety of parents and children provided further support for this observation [7,8].

The aim of this study is to determine the anxiety levels of the parents and patients who were routinely informed before the procedure and examine the relationship between children's and parents' state and trait anxiety.

Materials and methods

Setting and participants

Necmettin Erbakan University ethics committee (2019/2059) approval and written consent from the legal guardian of each patient were obtained for the study. The study included children aged 6-14 years undergoing endoscopy under deep sedation, with American Society of Anesthesiology (ASA) scores of I-II, and their parents.

Patients with major chronic disease and neurological disease, patients and parents with communication difficulties and psychiatric illnesses, illiterate parents, patients and parents who did not volunteer were excluded from the study.

G*Power Software was used to determine the sample size. A total of 100 patients were needed for the F test with 90% power, 5% type I error level, and 25% effect size. 104 patients were enrolled, considering the possibility of exclusion.

Survey study

Immediately after the pediatric patient was taken to the treatment room, the parents were given a questionnaire to complete in privacy and without any pressure. The parental questionnaire consisted of 2 groups: The parental demographic questionnaire and the State-Trait Anxiety Inventory (STAI). The first group demographic questionnaire includes questions regarding age, gender, siblings of the child, level of parent education (primary / high school / higher education), parental residence (province / district / town / village), the order of birth

of the child who underwent the endoscopic procedure and whether they received anesthesia before.

State-Trait Anxiety Inventory

STAI is a self-reporting questionnaire that examines anxiety in parents. The scale consists of two separate measurements for trait (temperament or normal) anxiety and state (current or situational) anxiety, respectively [9]. The score ranges from 20 to 80 for each subscale and higher scores indicate higher levels of anxiety.

For each statement in the questionnaire, the participant was asked to choose between "almost never", "sometimes", "often" and "almost always". Items 3, 4, 6, 7, 9, 12, 13, 14, 17 and 18 were scored positively, while 1, 2, 5, 8, 10, 11, 15, 16, 19 and 20 were scored negatively. During the assessment, each item was scored between 1 (or -1) and 4 (or -4) (depending on its negative or positive value), and an additional 50 points were added to the total score.

Modified Yale Preoperative Anxiety Score

M-YPAS is used to assess children's preoperative anxiety. It contains 22 items in 5 categories (activity, emotional expression, state of arousal, vocalization, and use of parents).

Activity, emotional expression, state of arousal, and use of parents include four items, while vocalization includes six items. Each item is given 1 point.

Total corrected score is calculated by the following formula: (Activity / 4 + emotional expression / 4 + state of arousal / 4 + use of parents / 4 + vocalization / 6) × 100/5 [10].

M-YPAS can be used both in the premedication unit and at the beginning of anesthesia [11]. In this study, m-YPAS was applied before anesthesia induction. m-YPAS score ≥ 30 indicates anxiety [12,13].

Patient characteristics and anesthesia management

The day before the procedure, during preoperative preparation, the anesthesiologist explained the method and risks of administering anesthesia to parents, after which consent was obtained. On the same day, the pediatric gastroenterologist told the parents about the procedure and the risks that may occur in detail, and consent was obtained.

Demographic data (age, gender, ASA, weight) of the patients were recorded. Intravenous cannula was placed by an experienced nurse with topical (lidocaine) local anesthesia in the gastroenterology pediatric ward. No premedication was administered to the patients. The children's anxiety level, immediately after separation from parents, was evaluated with m-YPAS by an anesthesiologist who was not included in the study. Routine monitoring (electrocardiography, heart rate (HR), non-invasive blood pressure, peripheral oxygen saturation (SpO₂), end-tidal carbon dioxide (Et-CO₂)) were performed to the patients, and basal values and values after induction were recorded. Bispectral Index Monitoring (BIS 40-60) was performed and the depth of anesthesia was noted. Sedation level was evaluated with the Ramsay sedation scale (RSS). All patients were administered O₂ at 4 L / min with nasal cannula. In accordance with the standard practice, midazolam 1 mg, ketamine 1 mg / kg, and propofol to obtain 40 <BIS <60 were used in anesthesia. Total propofol dose and anesthetic agent doses consumed at the end of the procedure were noted. Anesthesia management was carried out by the same experienced

anesthesiologist. The endoscopic procedure was performed by an experienced pediatric gastroenterologist.

The duration of the procedure (the time between the start and the end of the endoscopic procedure) and recovery time (the time until the patient's modified Aldred score (MAS) was 10 in the postoperative care unit) were recorded. Complications (nausea, vomiting desaturation, hypoxia, etc.) were noted during the procedure and in the recovery room. Patients with Modified Aldred Scores of 10 were sent home with their parents.

Grouping of the patients

The patients were divided into two groups according to their anxiety levels. m-YPAS > 30 was considered the anxiety (+) group, while m-YPAS ≤ 30 comprised the anxiety (-) group.

Statistical analysis

Results of the study were analyzed using SPSS 19.0 software. Continuous variables were expressed as mean (standard deviation), and categorical variables as frequency and percentage (n, %). Data were tested for normal distribution with the Kolmogorov-Smirnov test, histogram and ±SD. Non-parametric data of the groups were compared using Mann-Whitney test and parametric data, with Independent t test. Categorical data were analyzed using Chi-square test. Spearman correlation test was used to investigate the relationships between parameters. Logistic regression analysis was used to identify independent predictors of anxiety. Regression analysis was performed with the significant parameters (age, ASA, gender, parental age, parental anxiety, location, number of siblings) determined by univariate analysis. P<0.05 was considered statistically significant.

Results

Demographic data of the patients

The study included 104 children between the ages of 6 and 14 years, who were to undergo endoscopy, and their parents. The mean age of the patients was 11.8 (2.6) years (6-14 years). The age and gender of the anxiety (+) (n=29) and anxiety (-) (n=75) groups were 8.8 (2.7) years, 12.9 (1.5) years (P<0.001) and Female/Male ratios (F/M) of 20/9, 45/30, respectively (P=0.5). There was no statistically significant difference between ASA scores of the groups (ASAI / ASAII=20/9 (n=29), 59/16 (n=46), (P=0.315)). The difference in weight comparison between groups (27.89 (10.26) (n=29), 45.33 (7.70) (n=75)) was significant (P<0.001) (Table 1).

Anxiety evaluation

The comparison of the anxiety levels of the groups is shown in Table 2.

Evaluation of hemodynamic data and anesthesia duration

There was no significant difference between basal hemodynamic data of the groups and hemodynamic data after anesthesia induction. Comparison of the anxiety (+) and (-) groups yielded no significant differences between procedure duration, recovery times, or additional propofol dose. However, complication rate in the group with anxiety was significantly higher than that of the group without (P=0.001) (Table 3).

Parental demographic data and anxiety levels

The mean ages of parents in the anxiety (+) and (-) groups were 37.3 (7.4) years and 41.2 (5.6) years, respectively

(P<0.001). Parental anxiety levels were not statistically significantly different between the two groups (P=0.543 / P=0.529). Parental education level in the anxiety (+) group was statistically significantly higher than that of the anxiety (-) group (P=0.011) (Table 4).

Table 1: Demographic Data of the Patients

	Anxiety (+) group (n=29) mean (SD)	Anxiety (-) group (n=75) mean (SD)	P-value
Age (years)	8.8 (2.7)	12.9 (1.5)	<0.001
Gender (F/M)	20/9	45/30	0.500
ASA (I/II)	20/9	59/16	0.315
Weight (kg)	27.8 (10.2)	45.3 (7.7)	<0.001

ASA: American Society of Anesthesiology

Table 2: Comparison of the m-YPAS scores of the groups

	Anxiety (+) group (n=29) mean (SD)	Anxiety (-) group (n=75) mean (SD)	P-value
Activity	1.7 (0.7)	1.0 (0.0)	<0.001
Vocalizations	2.5 (1.1)	1.0 (0.1)	<0.001
Emotional expressivity	2.6 (1.0)	1.0 (0.0)	<0.001
State of apparent arousal	2.6 (1.1)	1.0 (0.0)	<0.001
Use of parents	2.3 (1.0)	1.0 (0.1)	<0.001
Total m-YPAS	55.5 (18.3)	23.5 (0.8)	<0.001

m-YPAS: Modified Yale Preoperative Anxiety Scale

Table 3: Comparison of hemodynamic data, anesthetic dose, and duration of anesthesia of groups

	Anxiety (+) group (n=29) mean (SD)	Anxiety (-) group (n=75) mean (SD)	P-value
Basal MBP	85.4 (11.8)	89.0 (8.6)	0.087
Basal SpO2	98.5 (1.2)	98.4 (0.8)	0.470
Basal HR	86.6 (7.6)	90.1 (4.9)	0.025
Basal EtCO2	39.8 (11.6)	38.4 (2.4)	0.307
MBP after anesthesia induction	82.6 (10.3)	85.6 (8.9)	0.143
SpO2 after anesthesia induction	98.8 (0.7)	98.6 (0.7)	0.174
HR after anesthesia induction	86.3 (8.5)	90.7 (5.3)	0.012
EtCO2 after anesthesia induction	38.0 (2.7)	38.7 (2.8)	0.270
Ramsay Sedation Score	5.8 (0.3)	5.9 (0.2)	0.103
Duration of procedure (min)	7.1 (2.0)	6.8 (2.0)	0.476
Duration of recovery (min)	14.5 (3.8)	13.1 (4.1)	0.132
MAS	9.9 (0.2)	9.8 (0.3)	0.287
Propofol dose (mg)	12.4 (17.2)	12.9 (17.8)	0.893
Complication			0.001
Nausea (n, %)	5 (17.2)	4 (5.3)	
Vomiting (n, %)	0 (0)	2 (2.7)	
Desaturation (n, %)	4 (13.8)	0 (0)	

MBP: Mean Blood Pressure, SpO2: Peripheral Oxygen Saturation, HR: Heart Rate, Et-CO2: End-tidal Carbon dioxide, MAS: Modified Aldred Score

Table 4: Comparison of parental demographic data and anxiety levels

	Anxiety (+) group (n=29) mean (SD)	Anxiety (-) group (n=75) mean (SD)	P-value
Parents			
Age (years)	37.3 (7.4)	41.2 (5.6)	<0.001
Gender (F/M)	22/7	52/23	0.632
Number of children	2 (1-4)	3 (1-6)	0.197
STAI-state of the parents	44.4 (9.3)	43.0 (10.6)	0.543
STAI-trait of the parents	44.9 (6.4)	46.1 (8.8)	0.529
Education level			0.011
Primary school (n, %)	15 (51.7)	46 (61.3)	
High school (n, %)	2 (6.9)	17 (22.7)	
University (n, %)	12 (41.4)	12 (16.7)	
Residential area			0.112
City (n, %)	26 (89.7)	55 (73.3)	
Village/neighborhood (n, %)	3 (10.3)	20 (26.7)	
Anesthesia story (+/-)	7 (24.1%)/22 (75.9%)	12 (16.0%)/63 (84.0%)	0.398

STAI: State-Trait Anxiety Inventory

Spearman's Rho correlation analysis of parameters related to child's anxiety

There was a strong negative correlation between child age (P<0.001), a negative moderate correlation between parental age (P=0.008), and a weak positive correlation between complications (P=0.026) and child's anxiety. Spearman's rho correlation of anxiety-related parameters is shown in Figure 1a, 1b, 1c.

Regression analysis

Logistic regression analysis including age, ASA, gender, parental age, parental anxiety, location, number of siblings was performed to determine the independent risk factors

that are effective in the development of child anxiety. Young age was determined as an independent risk factor for increased levels of child anxiety (OR: 0.501, $P < 0.001$, 95% CI: 0.390-0.643).

evaluation including children between the ages of 2-16 years, they found that anxiety decreased with increasing age of children [22]. Young children are a risk factor for poor behavioral compatibility during induction [23]. Older children express less fear for preoperative preparations than younger children [24]. Older children can understand the necessity and requirements of the procedure, which helps them withstand it. Preparation of the child for the procedure and a pain-sensitive temperament can positively affect the child's response to a procedure [25,26].

In contrast to these studies, in a study that assessed the 3-12-year age group in Turkey, there was no significant correlation between the age of the child and maternal anxiety score [8].

While the mean age of the group with anxiety in the current study was 8.8 (2.7) years, it was 12.9 (1.5) years in the group without anxiety. In this study, although the study group comprised children in school age, the mean age of the children with anxiety was significantly lower. Young age was an independent risk factor anxiety. To reduce the preoperative anxiety of school-age children, it is useful to provide appropriate information directly to them [27].

Informing parents about procedures, communicating with doctors, and letting parents talk to other parents in a comparable situation reduces anxiety in parents and helps them support their children more effectively [4]. Factors that mothers thought would reduce maternal anxiety include getting more information from the doctor, talking with mothers who had anesthetic experience before, and being provided audiovisual information. It is thought that accompanying the child to the operating room and being present during the induction of anesthesia will decrease maternal anxiety [8].

A systematic psychological preparation provided to both parents and patients before endoscopy logically reduces the level of anxiety on procedures. Although the level of education affects the outcome of psychological preparation, it may not have a significant effect on the level of anxiety in parents [2]. One study reported that maternal education level had no effect on anxiety [28], while another stated that anxiety level increased with increasing maternal education level [29].

In our study, no information was provided to patients and parents other than routine information, since exclusive information and systematic psychological preparation is not always possible in intensive polyclinic conditions. It was observed that the education level of the parents of children with high anxiety was higher.

Limitations

This study was conducted in Turkey. There may be differences between pediatric gastrointestinal endoscopy-related anxiety situations between countries with diverse cultures. However, matching results have been emphasized in studies conducted in dissimilar cultures [6,22-25].

The second limitation of this study is that child anxiety risk factors were determined but their solutions were not mentioned. Future studies are needed to reduce anxiety, based on the results of this study.

Conclusion

This study showed that there was no interaction between preoperative anxiety in school-age children and parental anxiety.

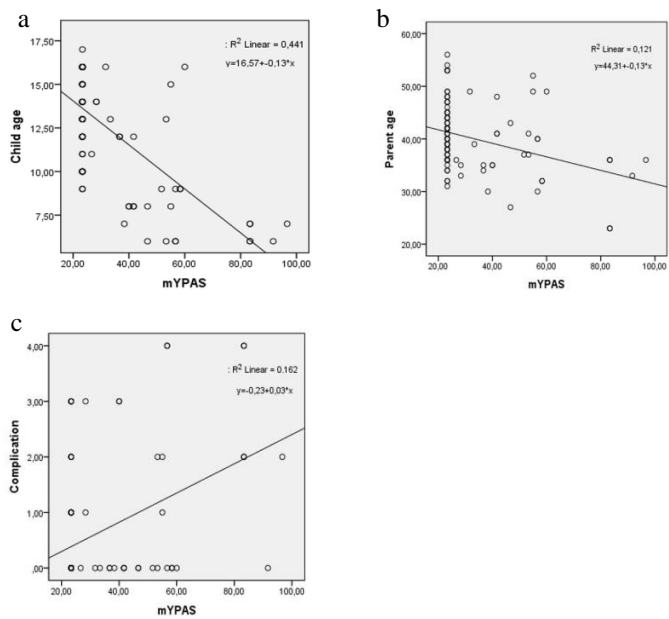


Figure 1: Spearman's Rho Correlation Analysis of parameters related to anxiety

Discussion

In this study, in which the anxiety level of school-age children who underwent gastrointestinal endoscopy was evaluated, young age was an important risk factor for anxiety development.

Many patients and parents are most concerned about the safety of endoscopy. Therefore, healthcare professionals performing pediatric gastrointestinal endoscopy should consider the anxiety of patients and parents before endoscopy [3]. Studies have found that the presence of an overly anxious parent during the induction of anesthesia does not benefit an anxious child and can increase anxiety in a calm child [14,15]. Intense anxiety and fear can cause poor cooperation, longer procedure time, increased sedation dose, and even increased complications [16]. It is known that there is a correlation between preoperative anxiety of children and parents' anxiety. The upcoming surgical stress can be perceived and transmitted between children and parents [17,18]. Emotional behaviors of parents have a significant impact on children modeling their parents' behavior [19], and coping mechanisms affect children's coping mechanisms [20]. However, such an interaction has been shown to be strong only in preschool children and their parents (state anxiety) [6].

In this study, routine information was given about the procedure and anesthesia. In this study, in which the study group was constituted by school-age children, it was observed that there was no relationship between child's preoperative anxiety and parental anxiety. There was a correlation between child age, parental age and child anxiety, and the rate of complications was significantly higher in highly anxious children. Schoolchildren are more independent and less affected by their parents, while preschoolers are still more dependent on their parents [6].

A study evaluating the preoperative anxiety levels in the parents of outpatients determined a relationship between the maternal anxiety score and the child's age [21]. In a child cohort

Young age was determined as an independent risk factor for the development of anxiety in children. Attention should be paid to the height of anxiety in younger patients in the school age group and necessary precautions should be taken.

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