

# Anesthetic Risks in General Anesthesia Practices in Pediatric Dentistry: A Retrospective Study

## Çocuk Diş Hekimliğinde Genel Anestezi Uygulamalarında Anestezik Riskler: Retrospektif Çalışma

Funda ARUN<sup>1</sup> (ORCID-0000-0001-7345-0318)

<sup>1</sup>Selçuk University Faculty of Dentistry Department of Pedodontics, Konya, Turkey

<sup>1</sup>Selçuk Üniversitesi Diş Hekimliği Fakültesi Pedodonti ABD, Konya, Türkiye

### ABSTRACT

**Aim:** We aimed to evaluate anesthesia-related complications in pediatric patients undergoing dental treatment under general anesthesia (GA).

**Materials and Methods:** After ethical committee approval, the records of pediatric patients who were operated between 01.09.2020-01.09.2022 at Selçuk University Faculty of Dentistry General Anesthesia and Sedation Clinic were evaluated with regards of demographic data, ASA, comorbidities, duration of anesthesia, recovery time, cardiac/pulmonary complications, and unanticipated hospitalization rate. The patients were divided into 3 groups according to age as group 1 (0-3 years), group 2 (3-6 years), group 3 (>6 years).

**Results:** The total number of patients were 398. All patients were between 2-15 years of age. Since the number of patients in group 1 is 7, it was not statistically evaluated in comparisons. The mean duration of anesthesia for all patients was 96.9 minutes, the times in group 2 and group 3 were 100.3 minutes and 88.7 minutes, respectively, and the difference between groups 2 and 3 was statistically significant ( $p=0.003$ ). The mean BMI values of all patients, in group 2 and in group 3 were 16.1, and 18.6, respectively and the difference between group 2 and 3 was statistically significant ( $p<0.001$ ). In group 2, the number of ASA 1 and 2 patients were 87.2% and 12.1%, respectively. In group 3, the number of ASA 1 and 2 patients were 56.4% and 40.6%, respectively. The difference between group 2 and 3 regarding ASA score was statistically significant ( $p<0.001$ ).

**Conclusion:** We have not found any patients under 3 years of age who were at risk according to the FDA warning regarding the risks of anesthetic drugs. No cardiac or pulmonary complications were observed in any of our patients and there were no unexpected hospitalizations.

**Key Words:** dental treatment, general anesthesia, pediatric dentistry

### ÖZ

**Amaç:** Genel anestezi (GA) altında dental tedavi uygulanan çocuk hastalarda anesteziye bağlı komplikasyonları değerlendirmeyi amaçladık.

**Gereç ve Yöntem:** Etik kurul onayı alındıktan sonra Selçuk Üniversitesi Diş Hekimliği Fakültesi Genel Anestezi ve Sedasyon Kliniği'nde 01.09.2020-01.09.2022 tarihleri arasında opere edilen çocuk hastaların kayıtları demografik veriler, ASA, komorbiditeler, anestezi süresi, derlenme süresi, kardiyak/ pulmoner komplikasyonlar ve beklenmeyen hastaneye yatış oranı. Hastalar yaşa göre grup 1 (0-3 yıl), grup 2 (3-6 yıl), grup 3 (>6 yıl) olarak 3 gruba ayrıldı.

**Bulgular:** Toplam hasta sayısı 398'di. Tüm hastalar 2-15 yaş arasındaydı. Grup 1'deki hasta sayısı 7 olduğu için karşılaştırmalarda istatistiksel olarak değerlendirilmemiştir. Tüm hastaların ortalama anestezi süresi 96.9 dakika, grup 2 ve grup 3'teki süreler sırasıyla 100,3 dakika ve 88.7 dakikaydı ve grup 2 ile 3 arasındaki fark istatistiksel olarak anlamlıydı ( $p=0,003$ ). Grup 2 ve grup 3'teki tüm hastaların ortalama Vücut Kitle İndeksi (VKI) değerleri sırasıyla 16.1 ve 18.6 idi ve grup 2 ile 3 arasındaki fark istatistiksel olarak anlamlıydı ( $p<0.001$ ). Grup 2'de ASA 1 ve 2 hasta sayısı sırasıyla %87.2 ve %12.1 idi. Grup 3'te ASA 1 ve 2 hasta sayısı sırasıyla %56.4 ve %40.6 idi. ASA skoru açısından grup 2 ve 3 arasındaki fark istatistiksel olarak anlamlıydı ( $p<0,001$ ).

**Sonuç:** Anestezik ilaçların riskleri ile ilgili FDA uyarısına göre risk kriterlerine uyan 3 yaş altı hasta bulamadık. Hiçbir hastamızda kardiyak veya pulmoner komplikasyon görülmedi ve beklenmedik bir hastaneye yatış olmadı.

**Anahtar Kelimeler:** dental tedavi, genel anestezi, çocuk diş hekimliği

### INTRODUCTION

Pediatric dentists treat children and adolescents using non-pharmacological behavioral techniques. However, dentists need pharmacological techniques such as general anesthesia (GA) and sedation to complete their oral treatment in common dental problems, physical or mental disability, concomitant serious systemic disease, maxillofacial surgery, general behavioral management problems or difficulty in cooperation. GA is an effective and safe method for patients in whom dental treatment is not possible under local anesthesia, or conscious sedation. Dental G.A.; is the application of general anesthesia to the patient by the team under the anesthesiologists' responsibility for various dental procedures.<sup>1</sup> According to the "Behavior Guidance Guide for Pediatric Patients in Dentistry" published by the American Academy of Pediatric Dentistry (AAPD), the purposes of choosing GA in dentistry are listed as follows:

- Assisting in the treatment of patients who are at risk mentally, physically or medically,
- Relieving anxiety
- Reducing unwanted behaviors and reactions to dental treatment,
- Provide safe, efficient and effective dental care,
- Eliminate the patient's response to pain.<sup>2</sup>

In recent years, dental treatments performed under GA in pediatric patients are a frequently preferred behavior management model in pediatric dentistry, as it allows the completion of many dental procedures in a single session in a safe environment with minimal mental and physical anxiety. However, GA carries risks and complications for the patient's health. In the literature, it has been stated that exposure to anesthetic gases may cause neurological damage, in addition to hypoxia and infection, which are among these risks.<sup>3</sup>

On December 14, 2016, the U.S. Food and Drug Administration (FDA) announced that exposure to certain sedatives and general anesthetics may affect brain development in children under 3 years of age for procedures longer than 3 hours. This official warning has been added to the prospectus of 11 commonly used drugs with general anesthetic and/or sedative effects (halothane, desflurane, isoflurane, sevoflurane, propofol, methohexital, etomidate, ketamine, lorazepam, midazolam, pentobarbital).<sup>4</sup> In some studies, no relationship was found between anesthesia

Gönderilme Tarihi/Received: 6 Ocak, 2023

Kabul Tarihi/Accepted: 30 Ocak, 2023

Yayınlanma Tarihi/Published: 15 Haziran, 2023

Atrf Bilgisi/Cite this article as: Arun F, Anesthetic Risks in General Anesthesia Practices in Pediatric Dentistry: A Retrospective Study. Selçuk Dent J 2023; Selçuk Üniversitesi 3. Uluslararası Yenilikçi Diş Hekimliği Kongresi Özel Sayı: 230-234 Doi: 10.15311/selcukdentj.1230411

Sorumlu yazar/Corresponding Author: Funda ARUN  
E-mail: fundarun@gmail.com  
Doi: 10.15311/ selcukdentj.1230411

exposure and age, while in others, it was stated that this effect could only occur with more than one exposure. In a very recently published meta-analysis, it was stated that the neurological effect in children with multiple anesthetic exposures was 2 times greater than in a single exposure, but most of the studies reviewed may not have enough power to detect small effect size differences.<sup>5</sup>

In this retrospective study we aim to evaluate the number of children affected by the FDA warning, anesthesia-related complications, and children with unexpected hospitalization, according to age and duration of GA, in pediatric patients who underwent dental treatment under GA in our clinic over a 2-years period.

## MATERIAL AND METHODS

In this retrospective study, the records of pediatric patients who were treated under GA between September 2020 and September 2022 at Selçuk University, Faculty of Dentistry General Anesthesia and Sedation Clinic; age, gender, body mass index (BMI), ASA, duration of anesthesia, recovery time, cardiac/pulmonary complications, and unexpected hospitalization were evaluated after faculty ethics committee approval (06.10.2022/39).

At the General Anesthesia and Sedation Clinic of our faculty, all procedures under GA are performed by the physicians of the pedodontics department under the control of a single anesthesiologist and the same team. Pulse oximetry (SpO<sub>2</sub>), electrocardiogram (ECG), non-invasive blood pressure and end-tidal CO<sub>2</sub> pressure (pETCO<sub>2</sub>) measurement, which are standard monitoring methods applied to all patients operated under general anesthesia. After standard monitoring, general anesthesia is applied to the patients by the anesthesia team. All patients are given 8% Sevoflurane in the presence of 100% O<sub>2</sub> by inhaler at the induction of anesthesia. After the induction, intravenous (IV) catheterization is administered from the dorsum of the left hand as appropriate, and 0.6 mg/kg IV rocuronium bromide is administered as a muscle relaxant and 1.5 mg/kg IV fentanyl is administered for analgesia. After mask ventilation for an appropriate time, endotracheal intubation is performed using an appropriately sized endotracheal tube. In the maintenance of anesthesia, 2% sevoflurane is given by inhaler with 50:50% O<sub>2</sub>:N<sub>2</sub>O. When awakening the patients after the surgical procedure, 0,05 mg/kg IV neostigmine and 0,25 mg/kg IV atropine are administered to reverse muscle relaxation.

In the evaluation of BMI, Prof. Dr. Olcay Neyzi percentile curves were used which is only for Turkish boys and girls. According to this evaluation criterion, an age- BMI percentile value below 5 indicates thin, between the 5-85 percentile is normal weight, between the 86-95 percentile is being overweight (slightly obese), and obesity is above the 95 percentile.<sup>6</sup>

In the study, patients were divided into 3 groups as 0-3 years old, 3-6 years old and >6 years old. Demographic data in the study were summarized as frequency, percentage, arithmetic mean and median. Pearson chi-square test, Mann-Whitney U test and Kruskal-Wallis test were used for statistical analysis of differences between groups. Statistical significance level was accepted as  $\alpha=0.05$ . IBM SPSS Statistics 21 package program was used for statistical analysis of the study.

## RESULTS

In the evaluated 2-years period between 2020- 2022, it was determined that 398 patients out of 17603 patients who examined at the pedodontics clinic were treated under general anesthesia. The ages of the patients range from 2 to 15. When the patients were divided into three according to age groups, statistical comparisons were made between the 3-6 age group and the >6 age group, as there were only 7 patients in the <3 age group. Considering the general anesthesia indication according to the age groups of the patients, systemic disease is seen in 44.6% of children older than 6 years of age, while the rate of systemic disease in the 3-6 age group is 12.8%. In the 3-6 age group, 87.2% of the general anesthesia indications are the difficulty in cooperation of the patients. This difference between age groups is statistically significant ( $p<0.001$ ) Table 1.

**Table 1. The general anesthesia indication according to the age groups of the patients**

Age Groups	Systemic Disease	Unccoperation	Total Number of Patients
<3years	0 (0%)	7 (100%)	7
3-6years	37 (12.8%)	253 (87.2%)	290
>6	45 (44.6%)	56 (55.4%)	101
Total	82 (20,6%)	316 (79,4%)	398

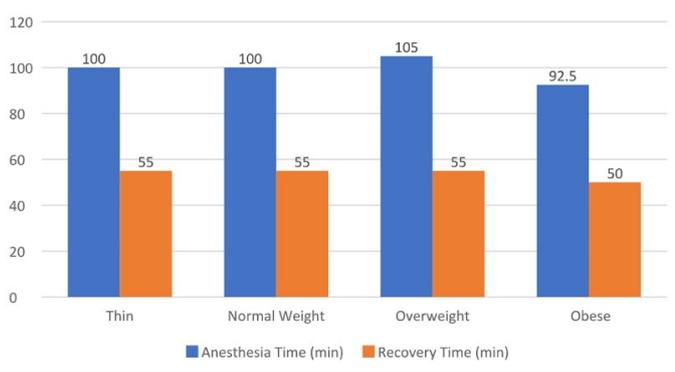
183 girls and 215 boys were in the 398 ASA I, II and III patients. Considering the ASA values of the patients according to age groups, 56.4% of the children older than 6 years of age have ASA I and 40.6% have ASA II, 87.2% of the 3-6 age group have ASA I and only 12.1% have ASA II. This difference between ASA values of age groups is statistically significant ( $p<0.001$ ) Table 2.

**Table 2. ASA values of the patients according to age groups**

Age Groups	ASA I	ASA II	ASA III	Total Number of Patients
<3years	7(100%)	0	0	7
3-6years	253 (87.2%)	35(12.1%)	2 (7%)	290
>6	57(56.4%)	41 (40.6%)	3 (3%)	101
Total	317(79,6%)	76(19.1%)	5 (1.3)	398

There is no significant difference between the median values of the patients' weight status, anesthesia and recovery times. Although these values were slightly lower in obese patients, the difference was not statistically significant (duration of anesthesia:  $p=0.733$  / time of recovery:  $p=0.809$ ) Figure 1.

The median BMI values of all patients were calculated as 16. The median BMI of the 3-6 age group is 15.4, and the median BMI of the patients older than 6 years is 17.8. This difference is statistically significant ( $p<0.001$ ).



**Figure 1.** Relationship between Patients' Weight and Anesthesia /Recovery Times

The median duration of anesthesia for all patients was 100 min; for the 3-6 age group was 105 min, and for patients older than 6 years is 85 min. The difference between the times was statistically significant ( $p=0.001$ ). The median recovery time of all patients was 55 min; the 3-6 age group is similarly 55 min, but for patients older than 6 years is 50 minutes. The difference is statistically significant ( $p=0.018$ ) Table 3.

**Table 3.** Relationship Between BMI, Anesthesia Duration and Recovery Times by Age Groups

Weight	n	%	BMI		Anesthesia Time(min)		Recovery Time(min)	
			Arithmetic Mean	Median	Arithmetic Mean	Median	Arithmetic Mean	Median
Thin	88	22.1	12.7	12.9	98,1	100	51	55
Normal Weight	198	49.7	15.9	15.9	96,5	100	51	55
Overweight	36	9.0	18.8	18.4	101,7	105	52,4	55
Obese	76	19.2	22.5	20.8	94,5	92,5	50,7	50

There was no statistically significant difference in gender distribution between the groups separated by age.

No cardiac or pulmonary complications were experienced in the patients. No patient had an unexpected hospitalization.

## DISCUSSION

Every year, millions of pediatric patients are indicated for procedures that require GA or sedation in health centers. Dental treatments under GA are also among these indications. Before the GA decision in pediatric dentistry; alternative treatment methods such as local anesthesia and sedation, the age of the patient, the general health of the patient, the risks associated with GA, the complications that may occur, the benefits to be obtained from the treatment, the necessity of dental treatment and the emotional development of the patient should be evaluated.<sup>7</sup> Finally, GA should be considered in cases where all routine conventional treatment methods fail.<sup>8</sup>

It has been observed that dental procedures performed under GA have increased in the last 10 years, especially in patients aged 3-6 years.<sup>9</sup> In our study, 290 of 398 patients consisted of patients in this age group. When the literature is examined, it is stated that pediatric patients undergoing dental treatment under GA are mostly children aged 5 years.<sup>10,11</sup> Children in this age group can not communicate and cooperate because they are afraid of the unknown and that they will be harmed, and dentists have difficulty in achieving treatment procedures.<sup>12</sup>

On December 14, 2016, the U.S. Food and Drug Administration (FDA) stated that exposure to certain sedatives and general anesthetics may affect brain development in children under 3 years of age and in pregnant women in the 3rd trimester, especially for repetitive procedures longer than 3 hours. This official warning was added to the prospectus of 11 commonly used drugs with general anesthetic and/or sedative effects (halothane, desflurane, isoflurane, sevoflurane, propofol, methohexital, etomidate ketamine, lorazepam, midazolam, pentobarbital).<sup>4</sup> In our study, only 7 patient aged 0-3 years underwent dental procedure under general anesthesia and were processed once.

When the distribution of patients by gender was examined in our study, it was determined that 54% were male and 46% were female. When compared with other studies examining the distribution of dental treatments under general anesthesia by gender, it was found that the number of female patients was close to the number of male patients in our study. In the study of Lee et al. in 2009 consisting of healthy and disabled children, 64.3% of the patients were male, 35.7% were female, and similarly, in the study of Cantekin et al. in 2014, this rate was 61.7% male and 38.3% female. indicated.<sup>13,14</sup>

In the study of Zhou et al. in which they examined dental treatments in pediatric patients under the age of 7, the median length of general anesthesia was 130 min.<sup>15</sup> The median duration of anesthesia for the patients in our study was 100 min. The median duration of anesthesia for the 3-6 age group is 105 min, and for the patients older than 6 years is 85 min. Although the difference is statistically significant, the limitation of this study in which we evaluated the complications of anesthesia is that the variety of dental procedures was not examined. However, this finding may suggest that medically complicated patients are treated with a more aggressive approach (less restorative treatment and more tooth extraction). The excess number of teeth in the planned treatment, radiographs taken during the procedure, and the application of the restorative treatment materials may prolong the duration of the procedure.<sup>16</sup>

In our study, outpatient anesthesia was administered to all patients in accordance with the recommendations of the Turkish Society of Anesthesiology and Reanimation (TARD) outpatient anesthesia committee. According to the guideline, ASA I and II patients are the most suitable, but recently, well-prepared ASA III patients can be accepted for daycare surgery.<sup>17</sup> There were 317 ASA I, 76 ASA II and 5 ASA III patients in this study. The fact that most of the ASA I patients (87.1%) are in the 3-6 age group, may be due to the fact that difficulties in cooperation due to dental anxiety are more common in this age range. In a study conducted with Turkish children in 2010, it was determined that 30% of children aged 3-6 and 11% of children aged 7-12 had dental anxiety. Another study reported that the level of dental anxiety began to decrease around the age of 6-7, and patient compliance with dental treatments increased with increasing age.<sup>18,19</sup>

In the literature, there are publications related to increased perioperative complications related to obesity, especially difficult airway management, upper airway obstruction, and a stay in the recovery room after anesthesia for more than 3 hours.<sup>20</sup> In a study of 2170 children who underwent adenotonsillectomy, intraoperative desaturation, multiple laryngoscopy attempts, or difficult mask ventilation were found to be positively associated with obesity. In this study, the overall incidence of overweight/obese pediatric patients was reported as 20.7%.<sup>21</sup> However, in our study, similar perioperative complications supporting these findings were not experienced.

Contrary to the studies in the literature, we used Olcay Neyzi percentile curves for Turkish boys and girls, to evaluate the BMI. According to these evaluation criteria, no significant difference was found between the median values of the patients' weight status, anesthesia and recovery times. Although these values are somewhat low in obese patients, the difference was not found to be statistically significant.

Unexpected hospitalization may occur in procedures performed with outpatient anesthesia. In a recently published study of 4235 pediatric patients scheduled for day anesthesia, only 78 (1.9%) of the patients required unexpected hospitalization.<sup>22</sup> Unexpected hospitalization was not observed in any of our patients.

## CONCLUSION

In this study;

1. Only 7 were under the age of 3 of the 398 patients who underwent GA and the duration of anesthesia was not longer than 3 hours in any case.
2. All the procedures of the patients were completed in a single session.
3. Therefore, we did not have any patients with increased risk according to the latest FDA warning regarding the use of anesthetics and sedatives.
4. None of the patients had unexpected hospitalizations.
5. None of the patients experienced a serious complication related to anesthesia.

## Değerlendirme / Peer-Review

İki Dış Hakem / Çift Taraflı Körleme

## Etik Beyan / Ethical statement

Bu çalışma Selçuk Üniversitesi 3. Uluslararası Yenilikçi Dış Hekimliği Kongresi'nde (25-27 Kasım 2022, Konya, Türkiye) sözlü bildiri olarak sunuldu.

Çalışma herhangi bir tez çalışması değildir.

Bu çalışmanın hazırlanma sürecinde bilimsel ve etik ilkelere uyulduğu ve yararlanılan tüm çalışmaların kaynakçada belirtildiği beyan olunur.

This study was presented as an oral presentation at Selcuk University 3rd International Congress of Innovative Dentistry (25-27 November 2022, Konya, Turkey).

The study is not any thesis work.

It is declared that during the preparation process of this study, scientific and ethical principles were followed and all the studies benefited are stated in the bibliography.

## Benzerlik Taraması / Similarity scan

Yapıldı - ithenticate

## Etik Bildirim / Ethical statement

ethic.selcukdentaljournal@hotmail.com

## Telif Hakkı & Lisans / Copyright & License

Yazarlar dergide yayınlanan çalışmalarının telif hakkına sahiptirler ve çalışmalarını CC BY-NC 4.0 lisansı altında yayımlanmaktadır.

## Finansman / Grant Support

Bu çalışma sırasında, yapılan araştırma konusu ile ilgili doğrudan bağlantısı bulunan herhangi bir ilaç firmasından, tıbbi alet, gereç ve malzeme sağlayan ve/veya üreten bir firma veya herhangi bir ticari firmadan, çalışmanın değerlendirme sürecinde, çalışma ile ilgili verilecek karar olumsuz etkileyebilecek maddi ve/veya manevi herhangi bir destek alınmamıştır. | The authors declared that this study has received no financial support.

## Çıkar Çatışması / Conflict of Interest

Bu çalışma ile ilgili olarak yazarların ve/veya aile bireylerinin çıkar çatışması potansiyeli olabilecek bilimsel ve tıbbi komite üyeliği veya üyeleri ile ilişkisi, danışmanlık, bilirkişilik, herhangi bir firmada çalışma durumu, hissedarlık ve benzer durumları yoktur. | The authors have no conflict of interest to declare.

## Yazar Katkıları / Author Contributions

Çalışmanın Tasarlanması | Design of Study: FA %100

Veri Toplanması | Data Acquisition: FA %100

Veri Analizi | Data Analysis: FA %100

Makalenin Yazımı | Writing up: FA %100

Makale Gönderimi ve Revizyonu | Submission and Revision: FA %100

## RESOURCES / KAYNAKLAR

1. Savanheimo N, Sundberg SA, Virtanen JI, Vehkalahti MM. Dental care and treatments provided under general anaesthesia in the Helsinki Public Dental Service. *BMC Oral Health*. 2012; 12:45.
2. AAPD, 2016. Guideline for Monitoring and Management of Pediatric Patients Before, During, and After Sedation for Diagnostic and Therapeutic Procedures: Update 2016. *Pediatr Dent*, 38, 6, 216-45.
3. Sun L. Early childhood general anaesthesia exposure and neurocognitive development. *Br J Anaesth* 2010; 105(Suppl 1): i61-i68.
4. Ganzberg S. The FDA Warning on Anesthesia Drugs. *Anesth Prog* 2017 Summer; 64:57-8.
5. Reighard, Charles, et al. "Anesthetic Exposure During Childhood and Neurodevelopmental Outcomes: A Systematic Review and Meta-analysis." *JAMA network open* 5.6 (2022): e2217427-e2217427.
6. Bundak, R., Furman, A., Gunoz, H., Darendeliler, F., Bas, F., & Neyzi, O. (2006). Body mass index references for Turkish children. *Acta Paediatrica*, 95(2), 194-198.
7. AAPD. Behaviour Guidance for the pediatric dental patient. 2015.
8. Koch, Goran, et al., eds. *Pediatric dentistry: a clinical approach*. John Wiley & Sons, 2017.
9. Chen, Yung-Pan, et al. A 10-year trend of dental treatments under general anesthesia of children in Taipei Veterans General Hospital. *Journal of the Chinese Medical Association*, 2017, 80.4: 262-268.
10. Milsom, K. M., et al. The relationship between anxiety and dental treatment experience in 5-year-old children. *British dental journal*, 2003, 194.9: 503-506.
11. Schrot, Robert J.; Smith, W. F. A review of repeat general anesthesia for pediatric dental surgery in Alberta, Canada. *Pediatric Dentistry*, 2007, 29.6: 480-487.
12. NGU, Katherine P., et al. Prospective evaluation of dental day case general anaesthetic for children. 2001. Master's Thesis. University of Sydney.
13. Lee, Pei-Ying, et al. Comprehensive dental treatment under general anesthesia in healthy and disabled children. *Chang Gung Med J*, 2009, 32.6: 636-42.
14. Cantekin, Kenan, et al. Analysis of comprehensive dental rehabilitation under general anesthesia at a dental hospital in Turkey. *Journal of Pediatric Dentistry/May-Aug*, 2014, 2.2.
15. Zhou, Pingping, et al. The effect of sevoflurane anesthesia for dental procedure on neurocognition in children: a prospective, equivalence, controlled trial. *BMC pediatrics*, 2021, 21.1: 1-10.
16. Forsyth, Anna R., et al. General anesthesia time for pediatric dental cases. *Pediatric dentistry*, 2012, 34.5: 129E-135E.
17. TARD (Türkiye Anesteziyoloji ve Reanimasyon Derneği) Günübürlük Anestezi Komitesi Taburculuk Kriterleri.
18. Bayrak Ş, Şen Tunç E, Eğilmez T, Tüloğlu N. Ebeveyn dental kaygısı ve sosyodemografik faktörlerin çocukların dental kaygısı üzerine etkileri. *J Dent Fac Atatürk Uni*. 2010;20:181-88
19. Folayan MO, Idehen EE, Ufomata D. The effect of sociodemographic factors on dental anxiety in children seen in a suburban Nigerian hospital. *Int J Paediatr Dent*. 2003;13: 20-26.
20. Nafiu OO, Reynolds PI, Bamgbade OA, et al. Childhood body mass index and perioperative complications. *Paediatr Anaesth*. 2007;17:426-430
21. Nafui OO, Green GE, Walton S, et al. Obesity and risk of peri-operative complications in children presenting for adenotonsillectomy. *Int J Pediatr Otorhinolaryngol*. 2009;73:89-95.
22. Van Caelenberg, Els, et al. Unanticipated admission after ambulatory surgery in the pediatric population: a single-center retrospective analysis. *Acta Chirurgica Belgica*, 2022, 122.3: 178-184.