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ORIGINAL RESEARCH

Retrospective evaluation of pediatric dental treatments under deep sedation

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Abstract

This study identified the dental treatment modalities administered to patients undergoing dental procedures under deep sedation and examined potential relations among treatment types, age, gender and tooth types. This study protocol included data from 502 patients, including a total of 5141 teeth, who underwent dental procedures under deep sedation between October 2022 and October 2023. The dental treatments were categorized based on primary types and subtypes. Subsequently, this study examined the associations between treatment types and age, gender and tooth type. Data were analyzed using the Chi-Square test, with the significance level set at 5%. Most patients (76.9%) were aged 0–6 years, and 93.4% of the treated teeth were primary teeth. The predominant treatment was restorative therapy (61.6%), followed by extraction (27.2%), endodontic treatment (6.1%), and preventive treatment (5.1%). Among restorative materials, compomer was the most frequently applied (49.8%). Significant differences between the treatment types were observed in terms of age group and tooth type ($p < 0.001$ for both) but not gender ($p = 0.920$). Based on our findings, restorative treatments and tooth extraction are the most frequently performed procedures, whereas endodontic treatments are performed less frequently under deep sedation.

Keywords

Deep sedation; Dental treatment; Endodontic treatment; Preventive treatment; Primary teeth; Restorative treatment; Tooth extraction

1. Introduction

Dental fear and anxiety can develop in childhood and persist into adulthood, leading individuals of all ages to avoid dental care. This not only causes distress to children but also extends to parents, resulting in adverse effects on oral health parameters [1–5]. Behavioral management techniques are often used to reduce dental fear and anxiety during routine pediatric dentistry procedures, improving disruptive behaviors and increasing the acceptance of dental treatment [6, 7]. These techniques, such as tell-show-do, distraction, reinforcement, voice control, modelling, and parental presence or absence, aim to establish a trusting relationship between the child and dentist [6]. However, in cases where these techniques fail to establish cooperation with the child, advanced pharmacological behavior guidance techniques such as sedation and general anesthesia may be necessary [2, 6]. Notably, the increasing number of operating rooms for pediatric dental procedures in recent decades reflects the growing need for dental treatment due to increased dental caries and heightened dental fear and anxiety [2, 5, 8].

In pediatric dentistry, various types of sedation are used to cater to the needs of young patients [8–11]. Moderate or conscious sedation is characterized by the maintenance of the patient's protective reflexes and airway patency [8–12]. Furthermore, the patient remains responsive to physical and verbal stimuli [9, 10]. However, for prolonged procedures, deep sedation may be necessary [2, 5, 8], in which patients can only respond to painful or repetitive stimuli, there may be inadequate respiratory functions, and the cardiovascular functions are typically maintained [9–12]. On the other hand, undesired cardiorespiratory complications, such as mild or moderate hypoxemia, laryngospasm, and bradycardia, may occur during deep sedation [5, 8]. Therefore, the duration of dental procedures should be minimized to reduce the risk of potential complications [8]. Moreover, reducing the procedure duration significantly influences dental treatment planning and may necessitate deviations from the standard treatment protocol compared to routine clinical conditions or general anesthesia procedures. Therefore, it is essential to analyze treatments performed under deep sedation. However, few studies have evaluated outcomes of dental procedures under such conditions.

This study aimed to identify the type of dental treatment selected for patients undergoing procedures under deep sedation and to investigate its association with the parameters such as age, gender and tooth type.

2. Materials and methods

2.1 Sample size calculation

Based on an effect size of 0.3, significance level of 5%, and statistical power of 80%, a sample size of 128 teeth was deemed to be adequate for analysis using one-way analysis of variance. This calculation was made utilizing a One-Way Analysis of Variance (ANOVA) test.

2.2 Study design

This retrospective study included data from 502 patients who underwent dental treatment under deep sedation at the Department of Pediatric Dentistry, Faculty of Dentistry, Ankara University, Türkiye between October 2022 and October 2023.

2.3 Patient selection

This study included pediatric dental patients who had previously undergone sedation and had an American Society of Anesthesiologist (ASA) physical status of I–III [13], age of 1–14 years, a Frankl Behavior Scale score of 1 or 2 for sedation indication [7], and Ramsay score of 6 (*i.e.*, no response to light glabellar tap or loud auditory stimulus). We excluded patients with an ASA physical status class of IV or V, age >14 years, allergy to anesthetic drugs, or history of liver or kidney disease that can alter drug metabolism.

2.4 Deep sedation procedure

The patients underwent deep sedation, rendering them completely unresponsive to painful stimuli, without the need for airway devices during the operation. A collaborative team performed the deep sedation procedures, including an anesthesiologist, two pediatric dentists, a nurse anesthetist, and a dental assistant, each with a minimum of 5 years of experience in their respective fields. Furthermore, the sedation room was fully equipped with an essential medical apparatus, including an anesthesia machine (Dräger Fabius; Drägerwerk AG & Co. KGaA, Lübeck, Germany), hemodynamic monitoring tools, an automatic external defibrillator, airway devices, and a comprehensive supply of all necessary anesthetic medications for administering deep sedation procedures. The induction phase involved bag-mask ventilation using 8% sevoflurane and a gas mixture of 50% oxygen and 50% air at a rate of 2 L/min. Following induction, vascular access was established, and intravenous fluid infusion was commenced. The initial propofol dose (1–2 mg/kg) was administered after 0.5 mg/kg lidocaine was given. Subsequently, deep sedation was maintained with a propofol infusion ranging from 250 to 300 mcg/kg/min using a Perfusor Space^{TM} (BBPS; B. Braun, Melsungen, Germany). The heart rate, noninvasive blood pressure, blood oxygen saturation (SpO_2), and pretracheal sounds on stethoscope were monitored continuously throughout the procedures. In addition, supplemental oxygen at a flow rate of 2 L/min was provided *via* a nasal cannula.

2.5 Demographic parameters and dental treatments

We reviewed the Patient Information Form and the Hospital Information Management System to record the age, gender and dental treatment types of patients. Patients with incomplete or inaccurate records were excluded. Data were entered into MS Excel Software 16.81 (Microsoft Corp., Redmond, WA, USA). Treatment was categorized as preventive (fissure sealant and fluoride therapy), restorative (glass ionomer restoration, composite restoration, compomer restoration, and stainless-steel crowns), endodontic (total coronal pulpotomy and root canal treatment), or tooth extraction.

2.6 Outcomes

The primary outcome was the frequency of each dental treatment in the study participants. Furthermore, as a secondary outcome, we evaluated associations among dental treatment types, age, gender and tooth type.

2.7 Statistical analysis

Data were analyzed using SPSS 11.5 software (IBM Corp., Armonk, NY, USA). Descriptive statistical analysis was performed for qualitative variables, including the number of teeth. The chi-square test was employed to analyze relationships between two qualitative variables. p values < 0.05 were considered indicative of statistical significance.

3. Results

The study included 502 patients (231 females and 271 males) who fulfilled the predefined eligibility criteria. Table 1 presents the demographic information, including age and gender of participants. Considering that the number of treated teeth varied among participants, we analyzed the number of teeth rather than the number of participants.

Tables 2,3,4,5,6,7 present the statistical analyses based on the number of teeth. Table 2 summarizes the descriptive analysis of age, gender, tooth type and subtype and dental treatment type and subtype.

Table 3 presents the distribution of dental treatment types and subtypes for primary and permanent teeth. Primary teeth underwent the following treatment types: fissure sealant, 22.6%; fluoride therapy, 88.9%; glass ionomer restoration, 100%; composite restoration, 8.6%; compomer restoration, 100%; stainless steel crown, 100%; total coronal pulpotomy, 100%; root canal treatment, 83.3%; and tooth extraction, 96.7%. For permanent teeth, these rates were as follows: fissure sealant, 77.4%; fluoride therapy, 11.1%; composite restoration, 91.4%; root canal treatment, 16.7%; and tooth extraction, 3.3%. Notably, none of the permanent teeth restored/treated by glass ionomer restorations, compomer restorations, stainless steel crowns, or total coronal pulpotomy.

Table 4 summarizes the statistical comparison of dental treatment types in terms of age, gender and tooth type. There were statistically significant differences between dental treatment types in terms of age and tooth type ($p < 0.001$ for both) but not gender ($p = 0.920$). The treatment types were compared

TABLE 1. Demographic data of the study subjects.

Age Groups	Patient Included, n (%)	Gender, n (%)		Ages (yr), Mean ± SD	
0–6	386 (76.9)	Female	179 (46.4)	Female	4.34 ± 1.22
		Male	207 (53.6)	Male	4.29 ± 1.20
7–9	101 (20.1)	Female	47 (46.5)	Female	7.74 ± 0.84
		Male	54 (53.5)	Male	7.62 ± 0.75
10–14	15 (3)	Female	5 (33.3)	Female	11.00 ± 1.00
		Male	10 (66.7)	Male	10.40 ± 0.84

SD: Standart Deviation.

TABLE 2. Descriptive values of the study subjects.

Variables	n (%)
Age (yr)	
0–6	4089 (79.6)
7–9	943 (18.3)
10–14	109 (2.1)
Gender	
Female	2332 (45.4)
Male	2809 (54.6)
Tooth Type	
Primary Tooth	4800 (93.4)
Permanent Tooth	341 (6.6)
Tooth Subtype	
Primary Molar	3305 (64.3)
Primary Incisor	932 (18.1)
Primary Canine	563 (11.0)
Permanent Molar	277 (5.4)
Permanent Premolar	12 (0.2)
Permanent Incisor	51 (1.0)
Permanent Canine	1 (≈0.0)
Dental Treatment Type	
Preventive Treatment	262 (5.1)
Restorative Treatment	3165 (61.6)
Endodontic Treatment	313 (6.1)
Tooth Extraction	1401 (27.2)
Dental Treatment Subtype	
Fissure Sealant	190 (3.7)
Fluoride Therapy	72 (1.4)
Glass Ionomer Restoration	146 (2.8)
Composite Restoration	151 (2.9)
Compomer Restoration	2558 (49.8)
Stainless Steel Crown	310 (6.0)
Total Coronal Pulpotomy	301 (5.9)
Root Canal Treatment of Primary Tooth	10 (0.2)
Root Canal Treatment of Permanent Tooth	2 (≈0.0)
Primary Tooth Extraction	1355 (26.4)
Permanent Tooth Extraction	46 (0.9)

among age (0–6, 7–9 and 10–14 years) and gender groups. The rates of preventive treatment, restorative treatment, endodontic treatment and tooth extractions administered to treated teeth were given in Table 4 for children aged 0–6 years, 7–9 years and 10–14 years, as well as for females and males.

Table 5 summarizes the statistical comparison between age groups in terms of all the dental treatment types. Statistically significant differences were observed among the age groups in terms of all the treatment types ($p < 0.001$). In particular, tooth extraction was applied to 23.8%, 37.8% and 64.2% of children aged 0–6, 7–9 and 10–14 years, respectively. Endodontic treatment was performed for 6.8% and 3.9% of teeth in children aged 0–6 and 7–9 years, respectively. Preventive treatment was applied to 4.1%, 8.8% and 11% of children aged 0–6, 7–9 and 10–14 years, respectively. Restorative treatment was performed for 65.3%, 49.5% and 24.8% of teeth in children aged 0–6, 7–9 and 10–14 years, respectively.

No statistically significant differences in dental treatment were observed between males and females ($p > 0.05$) (Table 6).

Statistically significant differences were observed in dental treatment between primary and permanent teeth ($p < 0.001$) (Table 7).

4. Discussion

Dental treatment elicits a natural fear response in pediatric patients, leading to resistance to certain procedures and avoidance of dental care [14]. Consequently, behavior management tailored to each child's needs and developmental stage is essential. Methods of such management, such as desensitization, positive-negative reinforcement, and tell-show-do, are commonly used to address undesirable behavior during dental procedures. However, while effective for some children, these approaches may not be applicable to all patients [15, 16]. The aforementioned challenges, as discussed previously [17, 18], present specific obstacles for pediatric dentists, leading to an increasing demand for pharmacological behavior guidance techniques, including sedation and general anesthesia, in pediatric dentistry. This heightened awareness underscores the importance of providing analgesia and anxiolysis during dental procedures [2, 11]. However, the use of general anesthesia in children poses risks of potential complications and neurotoxicity. Therefore, the ASA classification plays a crucial role in determining the suitability of pediatric patients for general anesthesia, considering factors such as the procedure duration and extent of dental treatment, particularly for those under 2 years of age [19–22]. Conversely, deep sedation offers several advantages, including cost-effectiveness, shorter

TABLE 3. Distribution of dental treatment types and subtypes.

Dental Treatment Type	Dental Treatment Subtype	Tooth Type	
		Primary Teeth, n (%)	Permanent Teeth, n (%)
Preventive Treatment			
	Fissure Sealant	43 (22.6)	147 (77.4)
	Fluoride Therapy	64 (88.9)	8 (11.1)
Restorative Treatment			
	Glass Ionomer Restoration	146 (100.0)	0 (0.0)
	Composite Restoration	13 (8.6)	138 (91.4)
	Compomer Restoration	2558 (100.0)	0 (0.0)
	Stainless Steel Crown	310 (100.0)	0 (0.0)
Endodontic Treatment			
	Total Coronal Pulpotomy	301 (100.0)	0 (0.0)
	Root Canal Treatment	10 (83.3)	2 (16.7)
Tooth Extraction	-	1355 (96.7)	46 (3.3)

TABLE 4. Comparative statistical analysis of descriptive variables for dental treatment types.

Variables	Dental Treatment Type				*p* value
	Preventive Treatment, n (%)	Restorative Treatment, n (%)	Endodontic Treatment, n (%)	Tooth Extraction, n (%)	
Age					
0–6	167 (4.1)	2671 (65.3)	276 (6.8)	975 (23.8)	
7–9	83 (8.8)	467 (49.5)	37 (3.9)	356 (37.8)	<0.001†
10–14	12 (11.0)	27 (24.8)	0 (0.0)	70 (64.2)	
Gender					
Female	124 (5.3)	1436 (61.6)	140 (6.0)	632 (27.1)	0.920†
Male	138 (4.9)	1729 (61.5)	173 (6.2)	769 (27.4)	
Tooth Type					
Primary Tooth	107 (2.2)	3027 (63.1)	311 (6.5)	1355 (28.2)	<0.001†
Permanent Tooth	155 (45.4)	138 (40.5)	2 (0.6)	46 (13.5)	

† *Chi-square test.*

TABLE 5. Statistical comparison of age groups and treatment types.

Variables	Age Groups			*p* value
	0–6, n (%)	7–9, n (%)	10–14, n (%)	
Tooth Extraction	975 (23.8)	356 (37.8)	70 (64.2)	<0.001†
Endodontic Treatment	276 (6.8)	37 (3.9)	0 (0.0)	<0.001†
Preventive Treatment	167 (4.1)	83 (8.8)	12 (11.0)	<0.001†
Restorative Treatment	2671 (65.3)	467 (49.5)	27 (24.8)	<0.001†

† *Chi-square test.*

TABLE 6. Statistical comparison of gender and treatment types.

Variables	Gender		*p* value
	Female, n (%)	Male, n (%)	
Tooth Extraction	632 (27.1)	769 (27.4)	0.825†
Endodontic Treatment	140 (6.0)	173 (6.2)	0.817†
Preventive Treatment	124 (5.3)	138 (4.9)	0.511†
Restorative Treatment	1436 (61.6)	1729 (61.5)	0.985†

† *Chi-square test.*

TABLE 7. Statistical comparison of tooth types and dental treatment types.

Variables	Tooth Type		p value
	Primary Teeth, n (%)	Permanent Teeth, n (%)	
Tooth Extraction	1355 (28.2)	46 (13.5)	<0.001†
Endodontic Treatment	311 (6.5)	2 (0.6)	<0.001†
Preventive Treatment	107 (2.2)	155 (45.4)	<0.001†
Restorative Treatment	3027 (63.1)	138 (40.5)	<0.001†

† *Chi-square test.*

procedure duration, minimal airway related manipulations, and the ability to perform interventions more conservatively compared to general anesthesia [19, 23, 24]. Consequently, we retrospectively evaluated the types of dental treatments administered during deep sedation procedures.

While sedation protocols offer certain advantages over general anesthesia, it is crucial to acknowledge that this technique can entail significant complications in pediatric dental patients. Risks include hypoventilation, apnea, airway obstruction, laryngospasm, and cardiopulmonary problems, which are particularly prevalent during deep sedation procedures [8–10, 12]. For instance, in a retrospective cohort study, Vural *et al.* [8] reported an overall complication rate of 15.7% in propofol-mediated deep sedation, which increased with the surgery duration. Furthermore, the duration of deep sedation increased with the number of teeth treated. Consequently, it is essential to perform dental procedures within safe limits, particularly in techniques with potential cardio-respiratory complications, such as deep sedation [8].

In this study, a retrospective analysis was conducted on 5141 teeth across 502 patients to examine the types and subtypes of dental treatments administered. We investigate these parameters in relation to age, gender, and tooth type. The study was motivated by the anticipation that the types of dental treatment might deviate from routine clinical conditions due to the time constraints imposed in cases managed with deep sedation. The majority of treated teeth (79.6%) belonged to pediatric dental patients aged 0–6 years. This observation aligns with the knowledge that this age group often experiences dental fear and anxiety, necessitating frequent utilization of behavioral guidance techniques. Consequently, these patients are more commonly referred for procedures involving deep sedation or general anesthesia [8, 11, 25, 26]. Furthermore, the majority of patients in this study were in the primary dentition stage, and 93.4% of the treated teeth were found as primary teeth. An examination of tooth types revealed variation based on the applied treatments, with primary molars and primary incisors predominantly found in this retrospective study.

One of the principal objectives of this study was to determine the primary type of dental treatment administered to the teeth. Restorative procedures emerged as the most frequently applied, followed by tooth extraction, endodontic treatment, and preventive treatments. As previously noted, the emphasis on maintaining shorter procedure times in deep sedation likely contributed to the higher prevalence of restorative procedures and extractions, aligning with a solution-oriented approach for pediatric dental patients.

Restorative applications constituted 61.6% of the treatments for the teeth included in this study, in line with expectations and previous findings. The findings of Gómez-Ríos *et al.* [22] support the observation that restorations (fillings) are commonly performed during dental treatments under deep sedation. In their study, restorations were performed in 91.73% of patients, encompassing both healthy individuals and children with special healthcare needs. Despite variation in study methodologies, whether under general anesthesia or sedation methods, dental restorations have consistently emerged as the predominant treatments in various studies. The emphasis on restorative treatment over tooth extractions is often highlighted to prevent oral dysfunction [22, 27, 28]. In addition, notably, the majority of treatments were compomer restorations (polyacid-modified composite resins), predominantly applied to primary teeth, the most common method applied [29]. Given that a significant proportion of the cases included in our study pertained to primary dentition, the predominant use of compomer restorations is expected finding, as compomers are recognized as the gold standard for restorations in primary teeth. The next most utilized types of restoration were stainless-steel crowns (SSCs), followed by composite and glass ionomer restorations. SSCs are the most commonly used treatment option for restoring and preserving the remaining coronal tissue of intensively damaged primary and permanent teeth. They demonstrate better clinical performance compared to amalgam and composites in terms of durability and longevity. Indeed, no other restorative option offers the advantages of cost-effectiveness, reliability, and durability in cases where temporary full coronal coverage is needed [30, 31]. In this study, 310 primary molars were treated with SSCs, guided by the aforementioned considerations. Several reasons were considered for applying these restorations to primary teeth. In permanent molars, the use of SSCs without tooth preparation represents an effective treatment option for severe cases of molar incisor hypomineralization [32]. In these cases, the decision not to apply SSCs to permanent molars was attributed to perceived challenges and time constraints associated with the procedure, along with concerns about occlusal adjustments and compliance. Therefore, a significant proportion (91.4%) of composite restorations in the present study were applied to permanent teeth.

Glass ionomers are often the preferred choice due to their fluoride-releasing capabilities, chemical adhesion, and anti-cariogenic properties. However, traditional glass ionomers have limitations such as sensitivity to moisture, lower fracture strength, and reduced wear resistance, which can impact their clinical success, particularly in Class II cavities [33–37]. To overcome with these limitations, glass hybrid restoratives have been developed in recent years, which incorporate smaller silicate particles and higher-molecular-weight acrylic acid, resulting in enhanced biomechanical properties compared to traditional glass ionomers [38, 39]. At the institution where this research was conducted, there was a preference for using glass hybrid restoratives for patients undergoing dental treatment under deep sedation. Consequently, glass ionomer restorations were applied to 146 primary teeth in the study. The rate of glass ionomer restorations may seem relatively low (approximately 5% of the total restorative treatments), compared to resin-containing compomer restorations, however, as we authors think that further studies are needed to investigate the prevalence of application of currently developed glass ionomers/hybrid systems under deep sedation.

Traumatic or poorly executed tooth extractions can lead to dental fear and anxiety in patients. Studies indicate that 67% of adults exhibit dental fear, often stemming from traumatic childhood experiences [40]. Consequently, there has been a growing emphasis on enhancing dental comfort during the tooth extraction process, with sedation or general anesthesia recognized as effective measures in reducing associated fear and anxiety. Therefore, pediatric dental patients requiring tooth extraction, exhibiting low levels of cooperation, and being of a young age often necessitate sedation procedures [40, 41]. Some studies have demonstrated tooth extractions as the most prevalent treatment in procedures involving sedation or general anesthesia [42]. This approach is underscored by the aim of achieving precise results, recognizing the significance of primary teeth in the physical, functional, and psychological development of children [27, 43]. Similarly, in this study, tooth extraction ranked second in frequency among other main dental treatment types, following restorative treatments. The high frequency of tooth extraction, with 1401 of 5141 teeth undergoing this procedure, was attributed to the anticipation that extraction might be a more suitable or definitive choice for teeth with questionable post-treatment prognosis or those that could prolong the procedure time with the inclusion of root canal treatment steps. In addition, lower tooth extraction rate in pediatric dental patients aged 10–14 years might be due to the presence of limited primary teeth for physiological exfoliation.

The central focus of the present research revolves around the notion that the time constraints imposed by the sedation procedure duration may result in variation in the frequency of different dental treatments. Indeed, a previous study [5] reported a mean procedure time of 57 min in deep sedation, whereas another [8] noted a mean procedure time of 65 min. Given the capacity to treat a significant number of teeth in approximately 1 h, procedures with longer durations, such as endodontic treatments, pose challenges for pediatric dentists working with deep sedation. Therefore, endodontic treatments are rarely performed under general anesthesia or deep sedation [22]. Schnabl *et al.* [44] reported that pulp capping, pulpotomy, or other endodontic treatments were not preferred in a retrospective study of cases performed under general anesthesia, both to avoid prolonged duration of the general anesthesia procedure and to prevent postoperative pain in the long term. Similarly, 6.1% of the teeth treated at the patients included in this study underwent endodontic treatment, the majority of which (96.1%) were total coronal pulpotomies of primary teeth. One reason for the preference for primary teeth pulpotomies in the majority of endodontic treatments is the complexity of clinical steps involved in root canal treatment procedures, such as working length determination, chemomechanical irrigation, and obturation. In addition, the time limits imposed by the sedation procedure also contribute to the preference for pulpotomies, which are generally less time-consuming than complete root canal treatments.

Although not as frequently administered as other treatments, preventive measures such as fissure sealants and fluoride therapy were also applied in this study. Fissure sealants were commonly applied to permanent teeth, while fluoride therapy was predominantly administered to primary teeth. Despite the emphasis on the importance of implementing preventive approaches in dental literature, few studies prioritize these procedures [22, 45, 46]. In patients, such as those included in the present research protocol, who are at risk for dental caries and may undergo repeated sedation procedures—a potential additional risk—it is advisable to apply preventive treatments more frequently to minimize the formation of caries. In this study, one of the primary reasons for the higher number of restorative procedures compared to preventive treatments, particularly for primary teeth, was the higher prevalence of cavitated carious lesions in the patient population, necessitating more restorative procedures. However, primary teeth with non-cavitated lesions were mostly managed with preventive approaches.

In this study, in addition to identifying the types and subtypes of dental treatments administered to the participants' teeth, we assessed these treatments in relation to age, gender, and tooth type. Significant differences were observed by age group and tooth type but not gender. Within each main treatment type, the number of treatments performed for participants aged 0–6 years was higher than for the other age groups. As previously mentioned, it was an anticipated finding that patients aged 0–6 years had a higher need for sedation, resulting in this patient group exhibiting the highest number of treated teeth in the study. At older ages, increased cooperation between the pediatric dentist and the pediatric patient reduces the need for sedation procedures. Similarly, for comparable reasons, the most common type of tooth for which various types and subtypes of treatment were administered was the primary tooth. It is noteworthy that some treatments, such as fissure sealants or composite restorations, which due to their characteristics should be applied to permanent teeth, are less frequently applied to primary teeth.

This study had several limitations. One of the primary limitations stemmed from its retrospective nature, wherein not all data for examination were uniformly recorded under standardized conditions. Differences or modifications in treatment protocols also presented limitations, as the study lacked the standardized steps typically provided in prospective research protocols. In addition, a significant limitation was the absence of a distinction between participants with comorbidities and those who were systemically healthy. Although our aim was not to conduct a statistical analysis between dental treatments in patients with comorbidities and systemically healthy patients, it should be acknowledged as a limitation that more radical dental treatments might be required due to the potential risk of complications in patients with comorbidities, which could influence the dental treatment plan.

5. Conclusions

Patients aged 0–6 years, particularly those with primary teeth, were more frequently subjected to deep sedation. The main procedures performed in the present retrospective study were restorative treatments and tooth extraction, whereas endodontic treatments were performed less frequently under deep sedation. Further prospective studies are needed to verify our results.

AVAILABILITY OF DATA AND MATERIALS

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

AUTHOR CONTRIBUTIONS

AD, NSÖ and ŞS—conceived and designed the experiments; AD, MHK, ÇV and ŞS—performed the experiments, AD, ÇV and ŞS—analyzed the data, AD, NSÖ, MHK, ÇV and ŞS—prepared figures and/or tables, authored or reviewed drafts of the article, and approved the final draft.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

The study protocol was approved by the institutional ethics committee of the Faculty of Dentistry, Ankara University, Türkiye, approved the present study (approval number 18/14, decision date: 05 December 2022). The study procedures were conducted in accordance with the Declaration of Helsinki. Written informed consent was obtained from the parents of study participants.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

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