

# A retrospective comparison of dental treatment under general anesthesia on children with and without mental disabilities

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## Abstract

**Purpose:** The purpose of this study is to determine the properties of the dental procedures performed on children with dental problems under general anesthesia and compared between the patterns of dental treatment provided for intellectual disability and non-cooperate healthy child.

**Materials and Methods:** In this retrospective study, the records of patients between the ages of 4 and 18 who were treated under general anesthesia were evaluated. Patients were divided into two groups: Those with intellectual disability and healthy patients who had difficulty cooperating. A statistical analysis of the mean standard deviation was conducted with a focus on two factors: Age and dental treatment methods.

**Results:** In this study, it was observed that restorative treatment and tooth extraction was generally higher in intellectual disability children than in their healthy children. When evaluating the health status of teeth, the value of decayed missing and filled teeth (dmf-t) was observed to be close in healthy and intellectual disability individuals in the 4-6 age groups; it was higher in individuals with intellectual disability in the 7-12 age groups. There was no significant difference in terms of periodontal treatment and fissure sealants in the 12-18 age groups.

**Conclusions:** By comparing the different patient groups who received dental treatment under general anesthesia, both the number of teeth extracted and DMF-T indices were higher in the disabled group. Therefore, especially more efforts should be made at encouraging these patients to visit the dentist earlier and receive primary preventive care.

**Key words:** Dental treatment, general anesthesia, intellectual disability, oral health

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## Introduction

Pediatric dentists provide oral care and solve dental problems for infants, children, adolescents and young persons with special care needs. The majority of children can be adequately treated with non-pharmacologic behavior modification techniques such as the tell-show-do technique. However, some children who have extensive dental problems cannot cooperate due to a lack of psychological or emotional maturity and/or mental, physical or medical disabilities. Their dental treatment needs to be completed by pharmacological behavior management, such as nitrous oxide/oxygen sedation

or general anesthesia.<sup>[1-3]</sup> The discipline of special care dentistry provides complex care to individuals with a wide range of disabling conditions. Oral hygiene and the health status (incidence of tooth decay and loss, as well as periodontal problems) of intellectual disability were reported to be worse than that of their healthy peers.<sup>[4,5]</sup> In particular, the relationship between disability status and oral hygiene has been established. Studies show that the greater the disability, the worse is the child's oral health, due to the difficulty of removing plaque.<sup>[6,7]</sup>

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The Samsun Oral Health Care Center provides comprehensive dental treatment for children younger than 18 years and young adults with special needs. A certain percentage of very young individuals, or those suffering extreme anxiety, medical impairment, and mental or physical disabilities, can only be treated under general anesthesia. Ultimately, the purpose of general anesthesia in dental treatment is to allow total oral rehabilitation, which consists of amalgam/composite restoration, pulpal treatment, extraction and scaling and fissure sealant in a single session.

The aim of this retrospective study was to evaluate the characteristics and treatment methods under general anesthesia in pediatric dental patients in this hospital between 2007 and 2011, and to compare the different treatment methods between healthy children and children with special health care needs according to the age groups.

## Materials and Methods

The research protocol was approved by the Ondokuz Mayıs University Medical Research Ethics Commission (2011/468) and Samsun Oral Health Care Center. In this study, the retrospective records of patients 4-18 years of age who were routinely treated under general anesthesia at Samsun Oral Health Care Center between the years 2007 and 2011 were evaluated. The patients were divided into two groups: Those with intellectual disability who required special care and healthy patients who had difficulty cooperating. Tooth extraction, tooth scaling, restorative treatments, tooth surface cleaning and fissure sealants were the procedures observed in the patient treatment records.

Inclusion criteria for a study of the absence of organ dysfunction, patients who doesn't have any problem to get general anesthesia, intellectual disability, extreme non-cooperation, 4-18 years of age, patients who do not treated dental treatment previously. An exclusion criterion for this study organ dysfunction, patients of orthopedic, visual, auditory disabilities etc., and patients previously treated dental treatment. Dental assessments, medical histories, clinical examinations, hematological tests, and dental radiographs of all patients were taken prior to general anesthesia. The treatment plan for each patient was developed, and the parents were notified about general anesthesia and dental treatment. Anesthesia specialists assessed the patient's general condition and the patient was recommended before general anesthesia. Before the operation, the treatment plan was revised, and the final decision was made. The dental treatment was performed under general anesthesia by means of nasotracheal intubation.

Patients were divided into three age groups according to patient records: 4-6, 7-12, and 13-18 years. The decayed missing and filled teeth (dmft) and the DMFT scores for

primary and permanent teeth were recorded before dental treatment under general anesthesia.

DMFT, dmft =

$$\frac{\text{Decayed teeth} + \text{Missing teeth} + \text{Filled teeth}}{\text{Total person}}$$

Periodontal disease assessment was carried out according to community periodontal index (CPI) and using CPI probe. According to these criteria, periodontal disease and dental caries were determined, and it was identified whether or not the patients were in need of treatment. When considered dmft-t and DMF-T values, decayed and filled teeth were included in the index. As the 7-12 age group is the period of mixed dentition, primary teeth were not considered missing if they had fallen out less than 2 years prior. In the 12 and above age group, all missing and filled teeth were included in the index. Restorative treatments (composite, amalgam and glass ionomer restorations), extractions, dental scaling and fissure sealants applications to primary and permanent teeth were recorded under general anesthesia. It was decided to extract the teeth that were not provided canal treatment indication in a single appointment under general anesthesia. The two groups of patients were recorded separately: The intellectual disability group was recorded as M, and the healthy group was recorded as H. Chi-square ( $\chi^2$ ) analysis was applied to analyze whether or the dmft-t and DMF-T scores were statistically dependent on whether the children were healthy or disabled. If it was dependent, the contingency coefficients (%) for each contingency table were calculated to determine the degree of association between the dmft-t/DMF-T scores and healthy/intellectual disability. A  $z$ -test was then utilized to determine any further differences between the dmft-t and DMF-T scores in healthy and intellectual disability. In addition, an independent sample  $t$ -test was applied to determinate the difference between the groups, using the Statistical Package for Social Sciences (SPSS IBM Seattle) package program (SPSS 16.0 V, IBM Corporation, USA). The level of significance was determined at  $P < 0.05$ .

## Results

In this study, a total of 234 children with age ranged from 4 to 18 years were evaluated; 170 were intellectual disability (group M) and 64 were healthy (group H). The distribution of patients treated under general anesthesia varies according to age group and disease. As patient age increases, the necessity for treatment under general anesthesia in healthy individuals is eliminated; on the other hand, in intellectual disability patients, the number of patients treated under general anesthesia increases with age [Table 1]. Table 2 shows the distribution of dmft-DMFT indices by age group. While for the 4-6 age group there were no significant differences dmft-t indices, 7-12 age group were there were significant difference in dmft-t scores. The group M had the dmft-t indices (6.02) aged, group H (4.51)

aged group 7-12. There was significant difference in dmft indices ( $P < 0.01$ ). When analyzed by age group as well as disability type, group M had DMF-T indices values (4.32), group H (2.47) among participants aged 7-12. Group M DMF-T indices values (7.42) group H (4.02) among participants aged 13-18.

According to the Table 3, restorative treatments (composite, amalgam and glass ionomer restorations except pulp therapies) and tooth extraction for the 4-6 age groups were performed more often on intellectual disability individuals than in healthy individuals. Periodontal treatment (scaling, not prophylaxis) was applied to the intellectual disability more often; there was no significant difference in fissure sealants [Table 3]. Table 4 shows the mean number of teeth treated with various modalities between patients from 7 to 12 year group. Restorative treatments were

Age groups	Study group N (%)		Total
	Intellectual disability	Healthy	
4-6	45 (19.2)	47 (20.1)	92 (39.3)
7-12	54 (23.1)	14 (6.0)	68 (29.1)
13-18	71 (30.3)	3 (1.3)	74 (31.6)
Total	170 (72.6)	64 (27.4)	234 (100)

Study groups	Age groups		
	4-6 years (n=92) ( $\chi^2=1.403$ ; P=0.522)	7-12 years (n=68) ( $\chi^2=3.404$ ; P=0.328)	13-18 years (n=74) ( $\chi^2=1.502$ ; P=0.432)
Dmf-t (mean±SD)			
Group M	3.20	6.02	-
Group H	3.42	4.51	-
DMF-T (mean±SD)			
Group M	-	4.32	7.42
Group H	-	2.47	4.02

DMF-T=Decayed missing and filled teeth, SD=Standard deviation

Treatments	Group M (n=45) (%)	Group H (n=47) (%)	P
Restorative treatment	140 (15.6)	94 (10.0)	0.001
Primary teeth	122 (13.6)	80 (8.5)	0.001
Permanent teeth	18 (2)	14 (1.5)	0.404
Fissure sealant	48 (5.3)	40 (4.2)	0.280
Tooth extraction	114 (12.7)	70 (7.4)	0.001
Primary teeth	102 (11.3)	62 (6.6)	0.001
Permanent teeth	12 (1.3)	8 (0.9)	0.321
Periodontal treatment	10 (1.1)	3 (0.3)	0.045

performed more often in intellectual disability individuals than in healthy individuals. Groups both H and M, more total teeth extracted more than restorative treatment. There were significant differences for the other treatment modalities, fissure sealants, total number of restored teeth and treated teeth, between these two groups. There was no significant difference in terms of periodontal treatment and fissure sealants. Table 5 shows, the difference in restorative treatments between the individuals with intellectual disability and the healthy individuals were found to be statistically significant in the 13-18 age groups ( $P < 0.01$ ). The difference between healthy and intellectual disability individuals in terms of restorative treatment was only due to the permanent teeth. Differences in tooth extraction between the healthy individuals and the individuals with intellectual disability were found to be statistically significant ( $P < 0.01$ ). Periodontal treatment was applied more often to individuals with intellectual disability; there were no significant differences in fissure sealant rates.

## Discussion

In our country, as in the whole world, there are many patients in need of dental treatment under general anesthesia (GA). Individuals with intellectual disability and pediatric patients who are not cooperative compose the majority of these patients.<sup>[8,9]</sup> The rate of disabled persons (orthopedic disabled, language-and speech-impaired, visually impaired, hearing impaired, intellectual disability) to the population in our country is only 4.8%.<sup>[10]</sup> The way to convince young children and intellectual disability individuals to undergo

Treatments	Group M (n=54) (%)	Group H (n=14) (%)	P
Restorative treatment	82 (6.32)	42 (12.5)	0.001
Primary teeth	60 (4.6)	30 (8.9)	0.010
Permanent teeth	22 (1.7)	12 (3.6)	0.081
Fissure sealant	97 (7.5)	32 (9.5)	0.247
Tooth extraction	128 (9.9)	51 (15.2)	0.013
Primary teeth	110 (8.5)	32 (9.5)	0.510
Permanent teeth	18 (1.4)	19 (5.7)	0.001
Periodontal treatment	14 (1.1)	8 (2.4)	0.139

Treatments	Group M (n=71) (%)	Group H (n=3) (%)	P
Restorative treatment	14 (1)	0 (0)	0.001
Permanent teeth	14 (1)	0 (0)	0.001
Tooth extraction	298 (16.6)	6 (5.6)	0.001
Permanent teeth	298 (16.6)	6 (5.6)	0.001
Periodontal treatment	48 (2.4)	1 (1.2)	0.321
Fissure sealant	142 (7.1)	12 (14.3)	0.064

dental treatment is quite difficult. This group of patients cannot be treated under local anesthesia in one session; many dental treatments may be performed under general anesthesia as soon as possible.<sup>[11,12]</sup> General anesthesia is beneficial to the patient, the parents, and the doctor.<sup>[9-14]</sup> In this study at Samsun Oral Health Care Center, we aimed to investigate which tooth treatment methods were applied under general anesthesia to children with and without intellectual disability retrospectively.

Pediatric dentists are concerned with the oral care of infants, children and young adults with disabilities who require special care. The biggest cause of inadequate medical treatment of children is due to difficulties caused by previous bad experiences or cooperation problems with the child. This is why some young children and intellectual disability patients need GA.<sup>[9-15]</sup> Dental treatment performed under general anesthesia in a hospital environment provides great efficacy and safety for particular groups of patients, such as very young or intellectual disability. In our study, 64 young healthy children and 170 children with intellectual disability (mean age 7.2 years) received treatment. Savanheimo *et al.*, were to determine extreme non-cooperation, dental fear and an excessive need for treatment were the main reasons for the use of comprehensive. Preventive measures formed only a minor part of the dental care given under general anesthesia.<sup>[16]</sup>

In this study, no consideration were taken regarding the level of dental disease, using the dmf-t and DMF-T indices when compared to other study<sup>[17]</sup> where the authors had recorded these index before the treatment begun. This index may help in determining the most appropriate dental treatment for the patient. For example, in intellectual disability patient who had undergone general anesthesia, the indices will help dentist to justify between extraction and restoration since dmf-t and DMF-T indices might suggested high caries risk.<sup>[18]</sup>

When evaluating the health status of teeth, the value of dmf-t teeth was observed to be close in healthy and intellectual disability individuals in the 4-6 age groups; it was higher in individuals with intellectual disability in the 7-12 age groups. On the DMF-T evaluation, however, high values were found in individuals with intellectual disability in both the 7-12 and 13-18 age groups. Harrison and Roberts encountered similar findings in their work. Vignehsa *et al.*, and Desai *et al.*, declared that intellectual disability have more incidences of oral disease, but they reported that those patients received less dental care. Furthermore those children requiring teeth brushing assistance had poorer oral hygiene.<sup>[19,20]</sup> Stanková *et al.*, were evaluated results obtained from the documentation of patients with special needs, who have undergone treatment under general anesthesia at the Pediatric Dentistry Department. DMFT was used for comparison. The significant difference between the DMFT of disabled patient and special patient population.<sup>[21]</sup>

To improve the bad oral health status of children with intellectual disability, there is a requirement for better education of all medical doctors, dentist and parents about the possibilities of better cooperation to help improve the quality of life of the children. When considering tooth extractions and restorative treatments, statistically, dental therapies are applied to individuals with intellectual disability more often than to healthy individuals for all age groups. The same findings were also reported by some researchers.<sup>[22-24]</sup> Providing oral hygiene for these individuals is usually the duty of the parents or attendants.<sup>[25-27]</sup> As a result, we found more complicated dental problems in intellectual disability. Oral hygiene of patients with intellectual disability can be only done with the assistance of their caregivers.

Tsai *et al.*, Lee *et al.*, and Harrison and Roberts' results are similar to our study results.<sup>[5,8,11]</sup> A larger number of extractions were seen in children who had intellectual disability than in healthy children. This is due to a higher rate of primary teeth extraction at an early age, and a higher rate of permanent teeth extraction in life than normal. In our study as well, tooth extraction rate was observed to be higher in individuals with intellectual disability than in healthy individuals in the 13-18 group. As a result of the oral hygiene on intellectual disability children in this age group is worse, the number of poor prognosis teeth is much more. For this reason it was decided to extract the teeth having poor prognosis in intellectual disability children, the teeth extractions increased compared with non-cooperative healthy children. It appears reasonable to conclude that pediatric dentists in the present study modified the treatment protocol and adopted a more-aggressive dental treatment strategy, such as extraction of teeth rather than preserving them for intellectual disability children due to their preexisting medical conditions. Osuji and Assery and Karim *et al.*, were to describe the characteristics of the children treated under GA, the indications, and types of dental treatment. The younger children in this study although had relatively more caries experiences, they received more restorations compared with the older children who had more tooth extractions. These results are compatible with our study.<sup>[28,29]</sup>

Dentists avoid complex treatments in intellectual disability in order to reduce complications and the need for retreatment. For example, a tooth extraction is preferred, instead of pulp therapy, for teeth with periapical pathologies.<sup>[8]</sup> Although periodontal treatment in patients of all age groups is performed more often on individuals with intellectual disability than on healthy individuals, there are no obvious differences regarding fissure sealant application. The ideal is not achieved in dental care on healthy or intellectual disability individuals, due to the lack of routine preventive treatments.

With increasing awareness of dental health care for people with disabilities, it will be possible to promote healthy teeth and reduce the number of teeth extracted in the permanent dentition.<sup>[13]</sup> In the literature, studies have reported that intellectual disability have poorer oral hygiene, advanced periodontal problems.<sup>[30-32]</sup> Moreover, they have dental caries, differences in the flow of saliva,<sup>[33-35]</sup> muscle and joint problems and chewing difficulties.<sup>[28,29]</sup> In this study, it was seen that the rates of restorative treatment and the need for extracting teeth in intellectual disability children are higher than in their healthy peers. This highlights the issue that children with intellectual disability must pay more attention to oral care.

## Conclusion

According to our study results, by comparing the different patient groups who received dental treatment under general anesthesia, both the number of teeth extracted and DMF-T scores were higher in the disabled group. Therefore, especially more efforts should be made at encouraging these patients to visit the dentist earlier and receive primary preventive care. This result shows the necessity of better preventive care of disabled and special patient.

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