



## Original article

# Comparison of the knowledge and attitudes of final year students and general dentists regarding the use of anesthesia in pediatric dentistry

Masoumeh Khataminia<sup>a</sup>, Razie Meshki<sup>a,\*</sup>, Milad Soruri<sup>a</sup> and Atousa Marzban<sup>b</sup>

<sup>a</sup> Department of Pedodontics, Jundishapur University of Medical Sciences, Ahvaz, IR, Iran

<sup>b</sup> School of Dentistry, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran



## ARTICLE INFO

## Article history:

Received 12 April 2023

Accepted 10 May 2023

Available online 29 June 2023

## Keywords:

General anesthesia

Pediatric dentistry

Ahvaz city

Indication

## A B S T R A C T

**Purpose:** Many children do not cooperate for their dental work. Therefore, there would be a delay in dental treatments and cause severe pain and even loss of some teeth. The present study was conducted to compare the knowledge and attitudes of final year students and that of general dentists toward the use of anesthesia in pediatric dentistry.

**Methods:** This descriptive cross-sectional study was performed on 77 individuals in 2 groups (38 final year dental students and 39 general dentists) in Ahvaz. Data were collected using a questionnaire consisting of 3 sections of demographic data, questions related to knowledge of general anesthesia (including 20 indicators with yes or no answers), and those related to attitude (including 20 items with completely agree, agree, disagree, and completely disagree answers). Comparing the knowledge and attitudes of the studied groups regarding the use of anesthesia and providing the necessary solutions for the optimal and correct use presented. SPSS was used to analyze the obtained data.

**Results:** The present study showed that students and dentists had intermediate knowledge and attitude about the use of general anesthesia in pediatric dentistry, its complications, and its indications. However, they expressed concerns about the complications of general anesthesia or the lack of sufficient information provided by the dental education system to students.

**Conclusion:** It is necessary to review the educational curriculum to increase students' information and equip dental schools, anesthesia facilities, and provide courses for general dentists.

© 2023 The Authors. Published by Elsevier España, S.L.U. This is an open access article under the license CC BY-NC-ND (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

## Comparación de los conocimientos y actitudes de estudiantes de último año y odontólogos generales respecto al uso de la anestesia en odontopediatría

## R E S U M E N

## Palabras clave:

Anestesia general

Odontopediatría

Ciudad de Ahvaz

Indicación

**Propósito:** Muchos niños no cooperan para su trabajo dental. Por lo tanto, se produciría un retraso en los tratamientos odontológicos y provocaría fuertes dolores e incluso la pérdida de algunos dientes. El presente estudio se realizó para comparar los conocimientos y actitudes de estudiantes de último año y de odontólogos generales hacia el uso de la anestesia en odontopediatría.

**Métodos:** Este estudio transversal descriptivo se realizó en 77 personas en dos grupos (38 estudiantes de odontología del último año y 39 dentistas generales) en Ahvaz. Los datos se recopilaron mediante un cuestionario que consta de tres secciones de datos demográficos, preguntas relacionadas con el conocimiento de la anestesia general (que incluye 20 indicadores con respuestas de sí o no) y aquellas relacionadas con la actitud (que incluye 20 ítems con completamente de acuerdo, de acuerdo, en desacuerdo y respuestas completamente en desacuerdo). Se presentaron comparando los conocimientos y actitudes de los grupos estudiados respecto al uso de la anestesia y brindando las soluciones necesarias para el uso óptimo y correcto. Se utilizó SPSS para analizar los datos obtenidos.

**Resultados:** El presente estudio mostró que los estudiantes y los odontólogos tenían conocimientos y actitudes intermedias sobre el uso de la anestesia general en odontopediatría, sus complicaciones y sus indicaciones. Sin

\* Corresponding author.

E-mail addresses: [meshki-r@AJUMS.ac.ir](mailto:meshki-r@AJUMS.ac.ir), [rmeshki60@yahoo.com](mailto:rmeshki60@yahoo.com) (R. Meshki).

embargo, expresaron su preocupación por las complicaciones de la anestesia general o la falta de información suficiente que brinda el sistema de educación dental a los estudiantes.

**Conclusión:** es necesario revisar el currículo educativo para aumentar la información de los estudiantes y equipar las escuelas de odontología, las instalaciones de anestesia y brindar cursos para odontólogos generales.

© 2023 Los Autores. Publicado por Elsevier España, S.L.U. Este es un artículo Open Access bajo la licencia CC BY-NC-ND (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

## Introduction

According to The Global Burden of Disease Study 2019, 520 million children suffer from dental caries.<sup>1</sup> The incidence of dental caries in children has decreased significantly in industrialized countries in recent decades. However, according to a study in the United States (2011–2014), 13.7% of children aged 2–8 still have untreated caries.<sup>2</sup> It is especially important because failure to treat dental caries can cause pain and infection, leading to tooth loss and extensive restorative treatments. In general, dentists should be able to provide conditions to control the child's behavior during treatment, and as a result, all children, regardless of their type of behavior, enjoy the benefits of dental treatment.<sup>3</sup>

On the other hand, many children cannot cooperate reasonably to do dental work. Therefore, there would be a delay in dental treatments and cause severe pain and even loss of some teeth. One of the main issues in pediatric dentistry is behavior control, which is necessary to carry out treatment for children.<sup>4</sup> These techniques include tell-show-do, desensitization, modeling, hypnosis, sedation and finally, general anesthesia.<sup>5</sup>

The American Association of Pediatric Dentistry (AAPD) authorizes the use of general anesthesia in cases such as non-cooperating patient, the experience of ineffective local anesthesia, excessive fear, excessive anxiety, inability to communicate with the patient, extensive surgery, prevention of psychological trauma to the patient, and the reduction of the medical risks.<sup>6</sup> Considering the application of general anesthesia in dentistry, especially in pediatric dentistry, and considering the advantages and disadvantages or risks<sup>7–13</sup> of this method, dentists must be familiar with this method so that they can recognize its prescription correctly and use the correct and standard methods in its implementation. Sometimes, the use of general anesthesia in pediatric dental care is necessary for safe, efficient, and effective care. Depending on the patient's condition, this can be done on an out- or inpatient basis.<sup>14</sup> However, patients who should not undergo general anesthesia for medical reasons, and healthy and cooperative children with low dental treatment needs should not be treated with this method.

The study of Ramezani et al.<sup>4</sup> stated that the advantages of using anesthesia in pediatric dentistry include performing all therapeutic tasks in 1 session, leading to no pain, no need for patient cooperation and more accessible work for the dentist. Disadvantages of this method also included cases such as complications of anesthesia or even death and the possibility of damage to teeth, lips, and soft tissue. Chanpong et al.<sup>15</sup> showed that 8.9% of the participants had moderate anxiety, and 5.5% had severe anxiety about dental treatments. About 12.4% of participants were interested in using sedation or general anesthesia, which was 31.1% among patients with high fear. The investigation of dentists' knowledge and attitude about the use of anesthesia in pediatric dental treatments showed that the average knowledge of anesthesia indication was 2.45 out of 4, contraindication was 2.56 out of 4, and its side effects were 3.67 out of 6. Poor attitude to this method was recorded in only 1 person, while 70% had moderate and 29% had good attitude.<sup>16</sup> Based on their experiences, dentists have a particular attitude toward using general anesthesia. In addition to general dentists and pediatricians, final-year dental students need sufficient knowledge and information in this field, considering that they will join the medical staff and the health system in the near future. The present study aimed to compare the knowledge and attitudes of final year students of

general dentistry with those of general dentists about the use of general anesthesia in pediatric dentistry.

## Materials and methods

### Participants

The present descriptive cross-sectional study was performed on 77 people (38 final year dental students and 39 general dentists) in Ahvaz in 2017–2018. All students of final year of dental school and their opponents from general dentists in the same city were selected. People who did not want to complete the questionnaire for any reason were excluded.

### Data collection

The data collection tool was a questionnaire designed based on previous studies<sup>16</sup> distributed among many students experimentally (Cronbach's alpha coefficient = 0.751). They were asked to express their knowledge and attitude about the use of anesthesia for the treatment of children in an interview. The research questionnaires were completed in 3 sections: demographic data, questions related to knowledge (with yes or no answers), and questions related to attitude about general anesthesia (with completely agree, agree, disagree, and completely disagree answers). In the knowledge section, 20 indicators, including familiarity with the basics of pediatric anesthesia theory, general anesthesia in dentists, and their basics of information on anesthesia in dentistry, were examined as yes/no and the percentage of knowledge was determined in the samples. Regarding attitude, 20 items answered by scales such as completely disagree, agree, disagree, and completely disagree were examined and recorded. These items included high cost, limited facilities, increased anxiety for anesthesia treatment, saving time which were marked as agreed, and others were against anesthesia treatment. The attitudes of students and dentists were accounted by considering the direction of the item and selecting the options.

### Statistical analysis

The level of knowledge and attitude toward each of the 20 indicators were determined and presented. The Chi-square test statistically judged demographic information, knowledge, and attitude. Knowledge and attitude toward anesthesia treatment were determined and statistically analyzed for general dentists who had a history of anesthesia treatment for patients. SPSS was used to analyze the obtained data.

## Results

A total of 38 final year dental students of Ahvaz University and 39 general dentists in Ahvaz (Ahvaz, Iran) randomly participated in the present study. Fifteen students (39.5%) were male and 23 (60.5%) were female, including 13.2% of 11th-semester students and 86.8% of 12th-semester students. Most of those 39 general dentists in Ahvaz were graduated in the cities (41%), followed by Tehran (35.9%), and abroad (23.1%). Regarding the question about familiarity with general anesthesia, 61.5% of general dentists and 52.6% of students were familiar

with general anesthesia in children. The Chi-square test showed that the difference between knowledge of general dentists and that of students was not statistically significant ( $P > .05$ ). Regarding the question about the admission of children, 59% of general dentists and 76.3% of students agreed to accept children for dental treatment ( $P > .05$ ). Regarding the source of pediatric anesthesia, 68.4% of students stated that they obtained their information from textbooks, and 64.8% of dentists obtained their information from other sources. The Chi-square test showed that the difference between students and dentists was significant regarding the source of information ( $P < .05$ ). Other results are presented in Table 1.

Based on the *t*-test of independent groups, Table 2 shows that the difference in the mean attitude score is statistically significant between the 2 groups of students and general dentists ( $P < .001$ ). Dentists had an attitude score of at least 1.85 out of 4 and a maximum score of 2.85, with a mean of 2.24 and a standard deviation of 0.26. Students had a minimum score of 1.1 and a maximum score of 3.1 with a mean of 2.19 and a standard deviation of 0.33. According to Table 3, 23% of dentists had a poor attitude and 76.9% had a moderate and good attitude. On the other hand, 7.9% of students had a poor attitude, 89.5% had a moderate, and 2.6% had a good attitude.

## Discussion

In the present study, the knowledge and attitude of final year dental students of Ahvaz University of Medical Sciences and general dentists in Ahvaz were evaluated toward general anesthesia usage in pediatric dentistry. The research questionnaire included questions with 4- or 2-choice answers with some items on the information of students and

**Table 2**

Students and dentists attitude score toward general anesthesia for children.

Group	N	Mean	SD	P-value
Dentist	39	44.9231	5.21327	<.001
Student	38	49.9474	6.73814	

dentists in terms of topics related to anesthesia as well as the demographic findings. The results of the present study showed that 52.6% of the students were familiar with the method of general anesthesia, and on the other hand, 61.5% of general dentists were familiar with this method, which the difference was not statistically significant between the 2 groups. Probably, more work experience of dentists compared to students has led to an increase in their familiarity. On the other hand, dentists were probably less inclined to admit children to the office than students due to the greater diversity of patients in terms of age, systemic status, and greater familiarity with the complexities and difficulties of work for children. The results of the present study are consistent with those of Ansari's study.<sup>16</sup> A study of Kalaivani et al. in India reported that about 90% of dental students had basic knowledge, and just 36% had a good knowledge. Further, 8% of the students did not know about the drugs administered for general anesthesia.<sup>17</sup>

The AAPD Academy permits general anesthesia in the following cases: non-cooperating patients, the experience of the ineffectiveness of local anesthesia, excessive fear and anxiety, inability to communicate with the child, and extensive surgery, which the opinion of both groups was close to these cases.<sup>6</sup> Ansari<sup>16</sup> stated the lack of cooperation of the child under local anesthesia (56%), the presence of systemic disease (23%), and tooth decay (21%) as reasons for receiving treatment with this method. In Keerthika and Mani's study concerning common indications of general anesthesia, general dentists expressed extreme non-cooperation, lengthy surgical procedures, potent emetic, and extreme dental fear as common indications for general anesthesia, respectively. In this study, the specialists reported, lengthy surgical procedures, extreme non-cooperation, extreme dental fear, and strong emetic reflex as common indications.<sup>18</sup> Heidari et al.<sup>19</sup> reported that the most common causes of child referral were young age, large number of dental work and lack of cooperation. Nazemi et al.<sup>20</sup> considered fear, anxiety, young age, mental and physical disability, and lack of cooperation as indications for anesthesia. The results of the present study are consistent with studies. Regarding the age limit for anesthesia, a high percentage of participants reported the absence of restrictions without any statistical differences between the 2 groups of respondents, which indicates the relatively high knowledge of these individuals about the indications for anesthesia.

Regarding the distance between 2 anesthetics for children, students, and general dentists mentioned  $4.8 \pm 1.9$  and  $7.1 \pm 2.7$  months, respectively. However, according to the latest AAPD guideline, repetition of general anesthesia is not acceptable due to increased morbidity and mortality and unwanted behavioral and psychological effects on the child.<sup>6</sup> Accordingly, the times mentioned in the present study are much shorter than the ideal time, but there is a difference between the 2 groups. Probably, due to the more contact with the children's parents and observing their stress by dentists, they mentioned a longer care time for re-anesthesia. Due to less desire of dentists to use anesthesia and, on the other hand, more passion of students to complete their theoretical and practical knowledge, a higher percentage of students showed a desire to obtain additional information about the use of anesthesia in pediatric dentistry (76.3% vs. 18%). The percentage of students' desire to obtain additional information is in line with desire to obtain additional information, which is consistent with that of Ansari's study.<sup>16</sup>

The results of the present study showed that both dentists and students believe that there is no high cost and limited facilities in general anesthesia. However, Dougherty's study<sup>5</sup> showed that the need for expensive tools and special equipment is one of the problems associated with this treatment method. However, in the mentioned study, these

**Table 1**  
Distribution of the surveyed individuals according to the questionnaire questions.

Questions	Group	Options	N	%	P-value
Obtain additional information	Student	Yes	24	63.2	>.05
		No	14	36.8	
	General dentist	Yes	20	51.3	
		No	19	48.7	
Observation of dental treatment under anesthesia in children	Student	Yes	23	60.5	<.009
		No	15	39.5	
	General dentist	Yes	12	30.8	
		No	17	69.2	
Age limit of children under anesthesia treatment	Student	Yes	12	31.6	<.9
		No	26	68.4	
	General dentist	Yes	10	25.6	
		No	29	74.4	
Number of indications for use of anesthesia (months)	Student	1	1	2.63	<.0001
		3	0	0	
		6	17	44.73	
		12	20	52.64	
	General dentist	1	24	61.5	
		3	7	17.9	
		6	31	79.5	
		12	8	20.5	
The most common complications after anesthesia	Student	Swelling and pain + vomiting	15	40	>.09
		Swelling and pain + aspiration	10	26	
		Vomiting + aspiration	8	21	
		Swelling and pain + vomiting	10	26	
	General dentist	Swelling and pain + aspiration	14	36	
		Vomiting + aspiration	8	20	
		Swelling and pain + vomiting	10	26	
		Swelling and pain + aspiration	8	20	
Inhibitory factors related to anesthesia	Student	Yes	20	52.6	<.0001
		No	18	47.4	
	General dentist	Yes	36	92.3	
		No	3	7.7	

**Table 3**

Classification of dentists and students attitude.

Group	Poor	Moderate	Good	Total
Dentist	9 (23.1%)	30 (76.9%)	0 (0.0%)	39 (100.0%)
Student	3 (7.9%)	34 (89.5%)	1 (2.6%)	38 (100.0%)
Total	12 (15.6%)	64 (83.1%)	1 (1.3%)	77 (100.0%)

factors were contraindications for anesthesia treatment. On the other hand, the participants in the present study stated that the hospital has no role in increasing anxiety and using this method. Eshghi et al.<sup>21</sup> showed that about 52% of the respondents were satisfied with the treatment in the hospital which is consistent with the results of this study. Ciftci et al. reported no significant difference in the mean duration of dental treatment under general anesthesia.<sup>10</sup> Although the participants of the present study stated that general anesthesia does not save time, Eshghi et al.<sup>21</sup> stated that most people believed that this method saves time.

In terms of attitude scores, both groups had a moderate attitude, and the attitude of students was significantly better than that of dentists, which can indicate the improvement of university education conditions to teach and create a positive outlook in recent years. However, improving the method's theoretical and practical training conditions is needed.

Concerning the importance of general anesthesia for pediatric dental treatments and awareness of its applications, students seemed to have more expectations from the dental education system to resolve some of the existing shortcomings. In general, the lack of practical education of this method in the university and insufficient teaching information were reported to be deterrent to students' use of this method. This issue reminds the need for more investment by the education system of the faculties to provide more education, both theoretically and practically, as well as equipping dental centers with anesthesia systems to facilitate students' access to anesthesia facilities. On the other hand, because most of the time, children refer to general dentists in the first treatment, these colleagues have an essential role in correct referral. Therefore, it seems necessary to retain dentists and courses for dentists and practical retraining courses to increase their ability to treat patients under anesthesia.

## Conclusion

According to the collected data, both groups of students and dentists (with a higher percentage of students) tend to treat children under anesthesia and seek additional information. While the level of knowledge and attitude of both groups was moderate, the results indicated the need to revise the curriculum to increase the information on general anesthesia in children, equip dental schools with anesthesia for easier access to students for treatment. It is necessary to hold practical and theoretical retraining courses for general dentists to increase their ability for better treatment.

## Ethics approval

The study is approved by ethics committee of Ahvaz Jundishapour University of Medical Sciences (IR.AJUMS.REC.1401.078).

## Funding

There is no funding to declare.

## Declaration of Competing Interest

All authors declare that they have no conflicts of interest.

## Acknowledgment

There is no acknowledgment for the present study.

## References

1. Network. GBoDC. Global Burden of Disease Study 2019 (GBD 2019). Seattle: Institute of Health Metrics and Evaluation (IHME); 2020. Available from: <http://ghdx.healthdata.org/gbd-results-tool>.
2. Dye BA, Mitnik GL, Iafolla TJ, Dye BA, Lopez Mitnik G, Iafolla TJ, Vargas CM. Trends in dental caries in children and adolescents according to poverty status in the United States from 1999 through 2004 and from 2011 through 2014. *J Am Dent Assoc*. 2017;148(8):550–65 e7.
3. Saedi S, Motamedian S, Khosraviani K, Saedi S, Motamedian S, Khosraviani K, Gholipour F, Asadi M, Rozegar M. Methods of controlling child behavior in dentistry, sedation and anesthesia. *Scient J Ilam Univ Med Sci*. 2012;20(40):134–43.
4. Ramazani N. Different aspects of general anesthesia in pediatric dentistry: a review. *Iran J Pediatr*. 2016;26(2), e2613.
5. Nadeema S, Noora SNFM, Shahabuddina S, Ghaffar ZA, Chongc S Eu. Characteristics and dental treatments of children under general anaesthesia. *Arch Orolac Sci*. 2020;15(1):35–44.
6. Dentistry. AAOP. Policy on medically necessary care. *Pediatr Dent*. 2015;37:18–22.
7. Khodadadi E, Nazeran F, Gholinia-Ahangar H. Awareness and attitude of parents toward pediatric dental treatment under general anesthesia. *J Oral Health Oral Epidemiol*. 2016;5(1):17–23.
8. Chen Y-P, Hsieh C-Y, Hsu W-T, et al. A 10-year trend of dental treatments under general anesthesia of children in Taipei Veterans General Hospital. *J Chin Med Assoc*. 2017;80(4):262–8.
9. Ibrahim NA, Azizi NZ, Nor NAM. Dental procedures and operating time under day-care general anesthesia among medically compromised and uncooperative pediatric patients. *Quintessence Int Arch Orolac Sci*. 2020;15(1):424–31 35–442022;53(5).
10. Ciftci V, Yazicioglu I. A retrospective comparison of dental treatment under general anesthesia provided for uncooperative healthy patients and patients with special health care needs. *J Clin Pediatr Dent*. 2020;44(3):196–201.
11. Al-Ogayyel S, Al-Haj Ali S. Comparison of dental treatment performed under general anesthesia between healthy children and children with special health care needs in a hospital setting, Saudi Arabia. *J Clin Exp Dent*. 2018;10(10):e963–9.
12. Abdelgawad F, Wassef N. Parental satisfaction after children's dental rehabilitation under general anesthesia. *Tanta Dental J*. 2019;16(4):197.
13. Choi J, Doh R-M. Dental treatment under general anesthesia for patients with severe disabilities. *J Dental Anesthesia Pain Med*. 2021;21(2):87.
14. Dean JA. McDonald and Avery's dentistry for the child and adolescent-e-book. Elsevier Health Sciences; 2021.
15. Chanpong B, Haas DA, Locker D. Need and demand for sedation or general anesthesia in dentistry: a national survey of the Canadian population. *Anesth Prog*. 2005;52(1):3–11.
16. Ansari G, Zafarmand A. Knowledge and attitude of dentists about the use of general anesthesia in pediatric dentistry. *Iran Pediatr Dent*. 2011;6(12):2–7.
17. Kalaivani N, Jain A, Varma A. Knowledge, attitude and awareness about general anesthesia among dental students. *Int J Recent Sci Res*. 2017;8(3):6261–16265.
18. Keerthika S, Man G. Knowledge, attitude and practice of dentists towards dental procedures under general anesthesia in children. *J Pharmaceut Res Int*. 2021;33(20B):83–93.
19. Heidari A, Shahabi M, Salehi Z, Kalantari F, Salehi Z. Evaluation of the cause of dental treatment in children under general anesthesia from the perspective of pediatric dentists and postgraduate students and parents of children under general anesthesia at the Dentistry School of Tehran University of Medical Science. *Int J Dentistry*. 2022, 6934016.
20. Nazemi B, Rezazadeh F, Beizieh A. Dentistry under general anesthesia in children. *Iran J Pediatr Dentistry*. 2014;10(1):77–86.
21. Eshghi A, Rezaeifar M, Jafarzadeh Samani M, et al. Evaluation of parental view toward dental treatment under general anesthesia in Isfahan. *J Adv Med Biomed Res*. 2010;18(73):67–75.