

Relationship Between Dental Fear and Behavior during Anesthesia Induction in Children Undergoing Dental General Anesthesia

Masoumeh Soltanmohammadi¹, Maryam Kazempour^{2*}

¹Department of Psychology, Ilam Branch, Islamic Azad University, Ilam, Iran.

²Department of Pediatric Dentistry, School of Dentistry, Ilam University of Medical Sciences, Ilam, Iran.

ARTICLE INFO

Article history:

Received 14 February 2026

Revised 07 March 2026

Accepted 22 March 2026

Keywords:

Dental fear;
General anesthesia;
Children

ABSTRACT

Background: The duration of anesthesia can be associated with psychological consequences, behavioral outcomes, decreased verbal IQ, emergence delirium, and learning disabilities.

Methods: In this study, a total of 80 pediatric patients between the ages of 3 and 5 years were enrolled. This study was a cross-sectional study investigating the baseline fear level and behavior during anesthesia induction. The instruments used included the Venham Picture Test (VPT) and the Pediatric Anesthesia Behavior Score (PABS) questionnaire. The ethical considerations were observed in the research [IR.MEDILAM.REC.1404.203]. The data obtained from this research were entered into SPSS software, version 16, and data analysis was performed.

Results: The findings showed a mean (SD) dental fear score for those who had visited a clinical psychologist was 4.76 ± 0.94 , whereas for those who had not visited a clinical psychologist, the mean (SD) score was 6.67 ± 0.85 ($P=0.000$). Furthermore, among the children who had been visited by a clinical psychologist, 18 of them (22.50%) were in the "Happy" group, and none of them were in the "Angry" group. Also, a significant relationship was observed between dental fear and pediatric anesthesia behavior. Specifically, patients with higher levels of dental fear obtained lower pediatric anesthesia behavior scores.

Conclusion: For improving children's behavior during dental treatments requiring anesthesia, focusing on reducing maternal anxiety and also providing a referral to clinical psychology before treatment can be a highly effective approach. Furthermore, consistent with the findings, the child's dental fear is a strong predictor of the manifestation of behavioral problems during anesthesia.

Introduction

The goal of pediatric dentistry is the prevention and treatment of oral diseases, which are fundamental to optimal lifelong oral health. One of the significant reasons patients avoid visiting dental service centers, consequently leading to the worsening of their oral and dental health, is dental fear and anxiety [1-2]. In

fact, paying attention to the mental health of all individuals, especially patients and specifically children, is a major priority that must be prioritized in all stages, including prevention and treatment [3-5].

Fear is defined as the physical or emotional response to a threat or danger after its conscious perception. Dental fear is a physiological or emotional reaction to one or more noxious or threatening stimuli in the dental profession, such as local anesthetic injection or the use of

The authors declare no conflicts of interest.

*Corresponding author.

E-mail address: kazempourm329@gmail.com

DOI:

Copyright © 2026 Tehran University of Medical Sciences. Published by Tehran University of Medical Sciences.



This work is licensed under a Creative Commons Attribution-NonCommercial 4.0 International license (<https://creativecommons.org/licenses/by-nc/4.0/>). Noncommercial uses of the work are permitted, provided the original work is properly cited.

rotating instruments [6]. Dental fear and anxiety have been defined due to negative experiences in dental surgeries. Dental fear can lead to patients avoiding visits, delaying, or even canceling dental appointments [7]. Dental fear can become a recurring and serious problem for both the patient and the dentist. To perform dental examinations and treatments with optimal quality for children, as well as to instill a positive attitude towards these treatments in them, proper awareness and understanding of children's behavior and the factors affecting it are of fundamental importance [8].

Dental fear may arise due to past bitter experiences, resulting in decreased patient satisfaction. Patient satisfaction has been defined as an important indicator in evaluating the quality of healthcare services, and numerous factors, such as psychological, individual, economic, social, and cultural characteristics, influence it [9]. Successful dental treatment for children depends not only on the dentist's skills but also on establishing communication with the child and maintaining the child's cooperation [10].

Furthermore, managing dental fear and anxiety can be challenging and stressful not only for the dentist but also for the patient and their accompanying person. For this reason, local anesthetics are used in dental procedures. However, in some cases, especially in the pediatric group, due to the need for greater and better cooperation from the child with the dentist, the use of general anesthesia becomes necessary [11-12].

Numerous pharmacological and non-pharmacological methods exist for pain control for all patients, including uncooperative children in dentistry. Based on the physician's diagnosis, general anesthesia may be used in children with very poor cooperation or those who do not cooperate at all [13-16]. General anesthesia is an unpleasant experience for children, often accompanied by adverse behavioral changes during anesthesia induction, awakening, or even during the discharge phase from the hospital [17]. The duration of anesthesia can be associated with psychological consequences, behavioral outcomes, decreased verbal IQ, emergence delirium, and learning disabilities [18-20]. On the other hand, undergoing anesthesia causes stress in parents, and this factor can also influence the creation of stress and anxiety in children before anesthesia [21].

Considering that oral and dental diseases are treated in a single session under general anesthesia, their immediate improvement can be effective in enhancing the quality of life related to oral and dental health. In fact, general anesthesia can provide the necessary ground for efficient dental treatment in a safe and stress-free environment [22-24].

Moreover, children, as one of the vulnerable groups, are exposed to various diseases (both chronic and non-chronic); therefore, special attention to this group is highly necessary [25-27].

Given the importance of dental treatments, this study was conducted with the aim of determining the relationship between dental fear and behavior during anesthesia induction in children undergoing general dental anesthesia in Ilam City.

Methods

In this study, a total of 80 pediatric patients between the ages of 3 and 5 years were enrolled. This study was a cross-sectional study investigating the baseline fear level and behavior during anesthesia induction.

Inclusion criteria for the study were obtaining informed consent from the child's legal guardian to participate in the study and the child being between the ages of 3 and 7 years.

Exclusion criteria were a history of previous surgery and/or anesthesia, neurological or psychological disorders in the patient, the occurrence of serious complications during surgery (such as cardiac shock, etc.), hospitalization, and the presence of underlying diseases.

The instruments used included the Venham Picture Test (VPT) and the Pediatric Anesthesia Behavior Score (PABS) questionnaire.

Venham Picture Test (VPT)

This instrument is used to assess dental anxiety in children. The child selects one item from 8 pairs of pictures, and scoring is based on their choice. In this tool, the unpleasant picture is scored as one point, and the pleasant picture is scored as zero. The overall anxiety score is classified between zero (least anxiety) and 8 (most anxiety) [28-30].

The corresponding score was divided into three domains: low to moderate fear, moderate to high fear, and severe fear.

Pediatric Anesthesia Behavior Score (PABS)

This instrument evaluates the level of cooperation or non-cooperation of the child during anesthesia administration. The score obtained ranges from 1 to 3, where a score of one means happy, a score of two means sad, and a score of three means angry [31].

It should be noted that in this study, no changes were made to the treatment plan and therapeutic interventions planned by the dentist or the anesthesiologist. In fact, all matters related to patient admission, anesthesia administration, dental procedures, laboratory tests, anesthetic medications, and patient discharge were performed according to the hospital's routine, and the researchers did not intervene in these aspects. The environment for all children was the same and included items to reduce stress (such as toys).

Given that the presence of parents might change or disrupt the scores obtained from the assessed tools,

parents were not present when calculating the scores for the individuals [31].

The ethical considerations observed in the research included obtaining informed consent from the parents, the voluntary nature of participation or non-participation in the study, and obtaining the Ethics Code Number [IR.MEDILAM.REC.1404.203]. The data obtained from this research were entered into SPSS software, version 16, and data analysis was performed.

Results

The findings show that 80 children between the ages of 3 and 7 years were included in the study. Of these, 35 (43.8%) were male, 50 (62.5%) had a mother's dental fear, 22 (27.5%) had a father's dental fear, 32 (40%) reported a history of child toothache, 37 (46.3%) reported a child report of a painful treatment experience, and 21 (26.3%) had a history of visiting a clinical psychologist before dental treatment.

The findings indicate that the level of dental fear was lower in children who had visited a clinical psychologist prior to receiving dental treatment compared to other patients.

Specifically, the mean (SD) dental fear score for those who had visited a clinical psychologist was 4.76 ± 0.94 , whereas for those who had not visited a clinical

psychologist, the mean (SD) score was 6.67 ± 0.85 ($P = 0.000$). (Table 1). Based on the findings, a significant association was observed between pediatric anesthesia behavior and both the mother's dental fear level and prior visits to a clinical psychologist.

Specifically, among children whose mothers reported dental fear, 26 of them (32.50%) were categorized in the "Angry" group, which was statistically significant ($P = 0.000$). Furthermore, among the children who had been visited by a clinical psychologist, 18 of them (22.50%) were in the "Happy" group, and none of them were in the "Angry" group (Table 2).

According to the findings, regarding the distribution of dental fear scores, 18 children (22.5%) were classified in the "Happy" group, 29 children (36.3%) in the "Sad" group, and 33 children (41.3%) in the "Angry" group. Furthermore, in terms of pediatric anesthesia behavior, 44 children (55%) were placed in the "Moderate to High Fear" group, while 36 children (45%) were in the "Severe Fear" group.

Additionally, no association was found between dental fear status and gender (Table 3,4). According to the findings, a significant relationship was observed between dental fear and pediatric anesthesia behavior. Specifically, patients with higher levels of dental fear obtained lower pediatric anesthesia behavior scores (Table 5).

Table 1- Comparison of dental fear according to the variables examined

Variable		Mean	SD	P value
Gender	Boys	6.02	1.24	0.99
	Girls	6.28	1.19	
Mother's dental fear	Yes	6.78	0.93	0.84
	No	5.16	0.94	
Father's dental fear	Yes	6.04	1.4	0.24
	No	6.22	1.28	
Child's report of a toothache	Yes	6.31	1.37	0.41
	No	6.08	1.10	
Child's report of painful treatment	Yes	6.02	1.36	0.31
	No	6.30	1.08	
Visiting a clinical psychologist before dental treatment	Yes	4.76	0.94	0.000
	No	6.67	0.85	

Table 2- Comparison of pediatric anesthesia behavior according to the variables studied

Variable		Happy	Sad	Angry	P value
Gender	Boys	10 (12.50%)	15 (18.75%)	10 (12.50%)	0.92
	Girls	8 (10.00%)	14 (17.50%)	23 (28.75%)	
Mother's dental fear	Yes	3 (3.75%)	21 (26.25%)	26 (32.50%)	0.000
	No	15 (18.75%)	8 (10.00%)	7 (8.75%)	
Father's dental fear	Yes	5 (6.25%)	9 (11.25%)	8 (10.00%)	0.19
	No	13 (16.25%)	20 (25.00%)	25 (31.25%)	
Child's report of a toothache	Yes	7 (8.75%)	14 (17.50%)	11 (13.75%)	0.03
	No	11 (13.75%)	15 (18.75%)	22 (27.50%)	
Child's report of painful treatment	Yes	12 (15.00%)	13 (16.25%)	12 (15.00%)	0.27
	No	6 (7.50%)	16 (20.00%)	21 (26.25%)	
Visiting a clinical psychologist before dental treatment	Yes	18 (22.50%)	3 (3.75%)	0 (0.00%)	0.000
	No	0 (0.00%)	26 (32.50%)	33 (41.25%)	

Table 3- Frequency (percentage) of dental fear and pediatric anesthesia behavior in patients

Dental Fear		Pediatric Anesthesia Behavior	
Dimensions	N (%)	Dimensions	N (%)
Happy	18(22.5%)	Low to Moderate Fear	0(0)
Sad	29(36.3%)	Moderate to High Fear	44(55%)
Angry	33(41.3%)	Severe Fear	36(45%)

Table 4- Examination of the status of dental fear in the studied individuals according to gender and clinical psychologist visit

Variable	Girls	Boys	Total	P value
Low to Moderate Fear	0 (0.00%)	0 (0.00%)	0(0)	0.42
Moderate to High Fear	21 (60.00%)	14 (40.00%)	35	
Severe Fear	23 (51.11%)	22 (48.89%)	45	
Total	44 (55.00%)	36 (45.00%)	80	

Table 5- Relationship between dental fear and pediatric anesthesia behavior

-	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	45.328	2	22.664	24.163	0.000
Within Groups	72.222	77	0.938		
Total	117.550	79			

Discussion

According to the findings, regarding the distribution of dental fear scores, 18 children (22.5%) were classified in the “Happy” group, 29 children (36.3%) in the “Sad” group, and 33 children (41.3%) in the “Angry” group. In the study by Ghandahari Motlagh et al., dental fear among children aged 3 to 5 years in Yazd city was examined. In that study, 158 children aged 3 to 8 years participated, including 124 children aged 3 to 6 years and 34 children aged 6 to 8 years. The mean CFSS-DS score was 45.60 (10.55). Moreover, greater fear and anxiety were observed among children aged 3 to 6 years compared with those aged 6 to 8 years [7]. In the study by Bayón et al., parental and child anxiety were evaluated. Among parents, 67.3% had low levels of anxiety, and 31.7% had moderate anxiety. In the group of children, 30.8% were classified as having “no fear,” while 69.2% were in the “little fear” group. A significant association was also observed between parental anxiety and the child’s oral condition [32]. The findings of these studies are consistent with the results of the present study regarding the presence of dental fear in children.

In the study by Raj et al. [33], 600 children aged 4 to 14 years were examined, and no significant difference was found in dental fear scores based on gender. These results confirmed the absence of a relationship between gender and dental fear. However, in Raj et al.’s study, as children’s age increased from 4 to 14 years, their dental fear decreased, which does not align with the results of the present study [33]. Similarly, in the study by Varmazyar et al., no correlation was found between gender and dental fear, but age was identified as a factor influencing dental fear [34]. In fact, dental fear arises

mainly from fear of the unknown, which occurs more frequently in younger children. As children grow older, their cognitive abilities develop, leading to greater understanding, awareness of health issues, and cooperation with the dentist [34-35].

In the present study, factors influencing pediatric anesthesia behavior included maternal anxiety and experience with clinical psychology consultations. Shishesaz et al. conducted a study aimed at assessing the relationship between maternal dental fear and anxiety and dental caries in their children (aged 5–12 years). The study included 374 mothers who accompanied their children to the dental faculty for treatment. According to the findings, there was no significant association between mothers’ age and their fear or anxiety toward dental procedures [6]. In the study by Wu et al., which investigated parental acceptance of anesthesia and children’s dental anxiety, 743 participants were evaluated. This cross-sectional study on 743 parent–child pairs in China found that over 70% of parents were unwilling to accept dental general anesthesia (DGA) for their children. However, parents’ awareness of DGA and children’s prior experience with anesthesia increased the likelihood of acceptance [36].

Conclusion

For improving children’s behavior during dental treatments requiring anesthesia, focusing on reducing maternal anxiety and also providing a referral to clinical psychology before treatment can be a highly effective approach. Furthermore, consistent with the findings, the child’s dental fear is a strong predictor of the manifestation of behavioral problems during anesthesia.

References

- [1] Feili F, Valadbeigi H, Negahdari B, Khooshnod S, Maleki A, Haddadi MH. Injectable hydrogel and its potential therapy for peri-implantitis. *Int J Polym Mater Polym Biomater*. 2026; 75(3):285-301.
- [2] Hossinzade M, Khademi A, Mahmodalalo m, Farshbafmanisefat F. The Effectiveness of Classical Cognitive Behavioral Therapy on Behavioral Adaptation, Anxiety and Dental Fear of children. *Iran J Rehabil Res Nurs*. 2023; 10(1):32-41.
- [3] Saiwan MJ, Al-showaily JS. Psycho-educational programs: Enhancing coping strategies and mitigating anxiety in chemotherapy patients. *Babcock Univ Med J*. 2025; 8(2):360-77.
- [4] Siwan MJ, Huusein HA. Proneness to anxiety and depression among middle school students: Does emotion expression matter. *Soc Sci*. 2022; 12(2):7205-12.
- [5] Shokri M, Tarjoman A, Borji M, Solaimanizadeh L. Investigating psychological problems in caregiver of pediatrics with cancer: A systematic review. *J Child Adolesc Psychiatr Nurs*. 2020; 33(4):229-38.
- [6] Shishesaz A, Yazdani R. Relation of maternal dental fear and anxiety with child's dmft/DMFT. *J Dent Med*. 2021; 33(4):240-8.
- [7] Ghandharimotlagh M, Fotouhi F, Ghandharimotlagh B, Jouya H. Evaluation of dentistry fear in 3-8 years old children referred to Shahid Sadoughi Dental School in Yazd. *Iran J Pediatr Dent*. 2019; 15(1):29-40.
- [8] Baghi SA, Amareh M, Heirat R, Hajivandi A, Aalizadeh Y. Evaluation of relationship between the children's dental fear and cooperation during dental treatment with the parents' general health. *Iran J Pediatr Dent*. 2018; 13(2):37-42.
- [9] Hoseinzadeh R, Bayat Far Y, Babadi F. Investigating the Association between Fear of Dentistry and Satisfaction with Medical Services in Ahvaz Jundishapur School of Dentistry. *Jundishapur Sci Med J*. 2024; 23(4):323-40.
- [10] Bahrololoomi Z, Sadeghieh T, Maghsoodi N, Pajouhandeh S. Evaluation of Relationship between the Children's Dental Fear with the Parental State-Trait Anxiety. *Jorjani Biomed J*. 2021; 9(4):65-73.
- [11] Zarebidoki F, Bahrololoomi Z, Hazeri Baqdad Abad M, Salari F, Zarebidaki Z. Relationship between Emotional Intelligence and Parenting Style with Dental Fear and Anxiety in Children Aged 6 - 15 Years. *JSSU*. 2024; 32(3):7673-85.
- [12] Daneshvar SH, Azizi S. The relationship between dental fear and cooperation of children during dental treatments with their parents' general health. *Dentistry 3000*. 2021; 9(1):118-26.
- [13] Baakdah RA, Turkistani JM, Al-Qarni AM, Al-Abdali AN, Alharbi HA, Bafaqih JA, et al. Pediatric dental treatments with pharmacological and non-pharmacological interventions: a cross-sectional study. *BMC Oral Health*. 2021; 21(1):186.
- [14] Kong X, Song N, Chen L, Li Y. Non-pharmacological interventions for reducing dental anxiety in pediatric dentistry: a network meta-analysis. *BMC Oral Health*. 2024; 24(1):1151.
- [15] Cianetti S, Paglia L, Gatto R, Montedori A, Lupatelli E. Evidence of pharmacological and non-pharmacological interventions for the management of dental fear in paediatric dentistry: a systematic review protocol. *BMJ Open*. 2017; 7(8):e016043.
- [16] Hatefi M, Parvizi R, Borji M, Tarjoman A. Effect of Self-Management Program on Pain and Disability Index in Elderly Men with Osteoarthritis. *Anesth Pain Med*. 2019; 9(4):e92672.
- [17] Beringer RM, Segar P, Pearson A, Greampet M, Kilpatrick N. Observational study of perioperative behavior changes in children having teeth extracted under general anesthesia. *Paediatr Anaesth*. 2014; 24(5):499-504.
- [18] Jiang R, Ni J, Chen J, Wang Z, Cheng Y, Li C. The Impact of Anesthesia Duration on Postoperative Cognitive and Behavioral Outcomes in Pediatric Patients: A Meta-analysis. *J Perianesth Nurs*. 2026; 41(2):471-82.
- [19] Malarbi S, Stargatt R, Howard K, Davidson A. Characterizing the behavior of children emerging with delirium from general anesthesia. *Paediatr Anaesth*. 2011; 21(9):942-50.
- [20] Khalighi E, Tarjoman A, Abdi A, Borji M. The prevalence of delirium in patients in Iran: a systematic review and meta-analysis. *Future Neurol*. 2019; 14(4):FNL34.
- [21] Arai YC, Kandatsu N, Ito H, Sato Y, Satake Y, Mizutani M, et al. Induction and emergence behavior of children undergoing general anesthesia correlates with maternal salivary amylase activity before the anesthesia. *Acta Anaesthesiol Scand*. 2008; 52(2):285-8.
- [22] Khodadadi E, Mohammadpour M, Motamedian SR, Kouhestani F. Failure Rate of Pediatric Dental Treatment under General Anesthesia. *Dent J (Basel)*. 2018; 6(3):25.
- [23] Lim SN, Kiang L, Manohara R, Tong HJ, Nair R, Hong C, et al. Interim therapeutic restoration approach versus treatment under general anaesthesia approach. *Int J Paediatr Dent*. 2017; 27(6):551-7.
- [24] Amin MS, Bedard D, Gamble J. Early childhood caries: recurrence after comprehensive dental treatment under general anaesthesia. *Eur Arch Paediatr Dent*. 2010; 11(6):269-73.
- [25] Sarafi M, Azimi B, Karimian M, Ebrahimisaraj G. Assessment of Clinical Characteristics of Patients with Penetrating Abdominal Trauma. *Arch Anesth Crit Care*. 2025; 11(4):509-512.
- [26] Azimi B, Sarafi M, Karimian M, Ebrahimisaraj G. Comparison of Patterns and Outcomes of Patients with Penetrating and Blunt Abdominal Trauma: A Retrospective Study. *Govarehsh*. 2025; 30(1):25-9.
- [27] Kalbassi S, Samadzadeh Etehadi S, Azimi MR. Investigating the Extent of mRNAs of the Genes

- Associated with Apoptosis and OGG1 in the Gingival Connective Tissue of Patients Suffering from Chronic Periodontitis and Diabetes Mellitus. *Asian Pac J Cancer Prev*. 2026; 27(1):47-52.
- [28] Agarwal M, Das UM. Dental anxiety prediction using Venham Picture test: a preliminary cross-sectional study. *J Indian Soc Pedod Prev Dent*. 2013; 31(1):22-4.
- [29] Krishnappa S, Srinath S, Vishwanath SK, Bhardwaj P, Singh R. Evaluation of facial image scale and Venham picture test used to assess dental anxiety in children. *J Indian Assoc Public Health Dent*. 2013; 11(3):31-5.
- [30] Venham LL, Gaulin-Kremer E. A self-report measure of situational anxiety for young children. *Pediatr Dent*. 1979; 1(2):91-6.
- [31] Prayunanto E, Widyastuti Y, Sari D. The association of modified Yale perioperative anxiety scale and pediatric anesthesia behavior on postoperative emergence delirium in children: A prospective cohort study. *Bali J Anesthesiol*. 2023; 7(2):88-93.
- [32] Bayón G, Stiernhufvud F, Ribas-Pérez D, Biedma Perea M, Mendoza Mendoza A. Parental Anxiety Disorders and Their Impact on Dental Treatment in Children Aged 4 to 13 Years: A Cross-Sectional Observational Study. *J Clin Med*. 2025; 14(6):1869.
- [33] Raj S, Agarwal M, Aradhya K, Konde S, Nagakishore V. Evaluation of Dental Fear in Children during Dental Visit using Children's Fear Survey Schedule-Dental Subscale. *Int J Clin Pediatr Dent*. 2013; 6(1):12-5.
- [34] Varmazyar A, Taram S, Rohani ZR. Dental Fear of Children and Its Relationship with Caries Experience. *J Dent Sch Shahid Beheshti Univ Med Sci*. 2021; 39(1):28-32.
- [35] Talo Yildirim T, Dundar S, Bozoglan A, Karaman T, Dildes N, Acun Kaya F, et al. Is there a relation between dental anxiety, fear and general psychological status? *PeerJ*. 2017; 5:e2978.
- [36] Wu T, Liu W, Chen Z, Huang J, Ye Y, Dai L. Association between children's dental anxiety and parental acceptance of dental general anesthesia: a cross-sectional study. *J Clin Pediatr Dent*. 2025; 49(2):126-136.