

ORIGINAL RESEARCH

Parents' perceptions and concerns regarding pediatric dental care under general anesthesia in Riyadh (Saudi Arabia): a cross-sectional study

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Abstract

The prevalence of dental caries in Saudi children is estimated to be 80% for primary dentition and 70% for permanent dentition. Dental treatment under general anesthesia (GA) might be recommended for children with uncooperative behavior or complicated dental treatment requirements. Despite its advantages, some parents have concerns regarding this approach. Nonetheless, little is known about Saudi parents' perceptions and concerns regarding pediatric dental treatment under GA. The main objective of this study was to determine parents' concerns and perceptions on pediatric dental treatment under GA in Saudi Arabia. It is a cross-sectional survey study. The inclusion criteria were: Arabic-speaking parents of healthy children aged 1–14 years referred to GA screening for dental treatment in a hospital. The final study cohort comprised 319 participants. The first part of the questionnaire included the children's and parents' demographic and clinical input, while the second part comprised the parents' perceptions and concerns. The survey was distributed in the dental office during GA screening visits. Our findings revealed that most parents were concerned about possible GA-related complications (78%), followed by postoperative pain (51%), intravenous line and cannula (49%) and coma or death (46%). This study highlights that most Saudi parents were concerned about the use of GA in pediatric dental treatment and the need for more awareness regarding the risks, benefits and expected outcomes of pediatric dental care under GA.

Keywords

Pediatric dental care; General anesthesia; Parental concerns; Cross-sectional

1. Introduction

Dental caries is one of the most prevalent chronic conditions in children worldwide [1, 2]. There is much evidence in literature on the effects of untreated decayed teeth, and it is widely known that painful teeth negatively affect a child's general health and quality of life, including growth, eating, learning and sleeping patterns [3, 4]. In Saudi Arabia, the prevalence of dental caries in children is reported to be 80% in the primary dentition of children under 6 years of age [5]. Alhabdan *et al.* [6] (2018) reported that the prevalence of dental caries in primary school boys aged 6–8 years in Riyadh was 83%.

Dental behavior management problems are characterized by uncooperative and disruptive behaviors performed in dental clinics resulting in treatment deferral or rendering the treatment impossible to perform in clinical settings [7]. Dental treatment under general anesthesia (DGA) is an alternative treatment approach for healthy patients with dental behavior management problems when behavioral management techniques have failed [8, 9]. DGA can be performed in both healthy and medically compromised children to provide comprehensive,

safe and high-quality dental care [7, 10]. Dental treatment in the operating room has many advantages over routine in-office treatment, including immediate pain relief, completion of all treatment in a single visit and enhanced treatment quality, especially for complicated cases [9–11]. It has been reported that DGA has a positive psychological impact on children [11, 12] and reinforces positive attitudes of parents and children toward oral health [13–15].

Despite these positive aspects, some parents are still concerned about hospital admission and the use of GA [16], influencing their decision toward their children's treatment [16, 17]. In this internet and technology era, patients have easy access to more information about treatment options and associated complications [17]. However, not all information may stem from reliable sources. In addition, considering that little is known about Saudi parents' perceptions and concerns on pediatric DGA, we believe that increasing knowledge on these topics would help enhance parents' awareness on relevant risks and benefits of pediatric dental care under GA in a more effective manner and help them make time decision regarding their children's treatment.

This study aimed to examine parents' perceptions and concerns regarding pediatric DGA in Saudi Arabia. The null hypothesis was that Saudi parents were not concerned about pediatric care under DGA.

2. Materials and methods

2.1 Setting

The study was conducted at the dental department of a tertiary care hospital (King Saud Medical City) in Saudi Arabia from March 2021 to April 2022. A new tool was formulated due to the lack of prior studies and related surveys on this topic. The first part of the questionnaire included questions on the demographic and clinical information of parents and their children, and the second part contained items about the parents' perceptions and concerns on pediatric DGA. The construct and content validity of the questionnaire were validated by two pediatric dentistry consultants, comments and suggestions were incorporated into the final version of the questionnaire, and a Kappa statistic of 0.99 and intraclass correlation coefficient of 0.99 was observed. The validity of the questionnaire was then tested in a pilot study with 50 parents. The final version of the survey was distributed in a dental office at GA screening visits by a trained investigator to all participants in a standardized manner. Parents were asked to either complete the questionnaire themselves or have the questions read out to them by the investigator, who then recorded their responses. The time to complete the form ranged between 40 to 45 minutes.

2.2 Participants

The inclusion criteria were as follows: Arabic-speaking parents of healthy children aged 1–14 years referred for DGA in a hospital clinic (King Saud Medical City) and agreed to participate in the study. The exclusion criteria were as follows: parents of children with special health care needs and parents who did not agree to participate in this study. The participants were assigned a number and selected randomly every day using electronically generated random numbers. Participants were requested to complete a paper-based survey.

2.3 Variables

Categorical variables of parents (relationship with the child, age, educational level, parent's history of prior GA treatment) and children (age, sex, child sequence, history of prior GA treatment) are presented as frequency and percentage. These exposure variables were associated with the outcome variable of parents' perceptions and concerns regarding pediatric DGA.

2.4 study size

Initially, a sample power calculation was conducted using the G-Power 3.1.9.7 (Heinrich-Heine-University, Dusseldorf, Germany) Sample power calculator. The sample comprised of parents (either mother, father or guardian) undergoing rehabilitation under DGA. In this pilot study, 30% of the parents had undergone prior DGA treatment. Hence, the minimum sample required a sample power of 95% with $\alpha < 0.05$ is 138.

2.5 Statistical methods

All data were managed using Microsoft® Excel® (Microsoft Office, Excel 2007, Redmond, Washington, U.S.). The data were analyzed using the SPSS software (version 25.0; IBM, Armonk, NY, US) for Windows. Non-parametric Chi-square tests were used to identify significant associations between variables. The values in Tables 3, 4, 5, 6 show the proportions of participants' positive responses. Statistical significance for all analyses was set at a $p < 0.05$.

Of the 319 parents assessed, 146 (46%) had undergone prior GA treatment. The minimum required sample size was 115 based on a 10% margin of error, 90% power and a 5% significance level. The number of included participants was 319, and the statistical power for analyzing the parents' perceptions and concerns regarding pediatric DGA in this study was 95%.

3. Results

Of the 329 parents who answered the questionnaire, 319 completed it, showing a response rate of 97% (319/329). Females accounted for the majority of the parents ($n = 294$, 92%), and 146 parents had undergone prior GA treatment (46%). Of the cohort who completed the survey, the age of 56% of the parents ranged between 30 and 39 years. The most common age group of the children was 3–6 years (59.2%), and most children had not undergone GA before (284; 98%). The participants' baseline data are presented in Table 1.

The responses to the questionnaire related to parent perceptions are shown in Table 2. Most parents were concerned about the complications of GA ($n = 250$, 78%), followed by postoperative oral pain (51%), intravenous lines and cannula (49%), and coma or death (46%).

Most parents chose "more explanation by doctors and nurses" ($n = 193$, 61%), followed by "to be present during general anesthesia induction" (189; 59%) for Q2. Moreover, for Q3, most parents responded that they expect the "elimination of dental pain" (281; 88%), followed by improved eating and feeding ($n = 133$, 42%).

Regarding parents-related variables (Table 3), there was no association ($p > 0.05$) between parents' sex and responses to "if your child is being treated under general anesthesia, what are you most concerned about?" except for the length of hospitalization, where mothers' were statistically significantly ($p < 0.05$) more concerned about the length of hospitalization than fathers. We found no association ($p > 0.05$) between parents' age and responses to "if your child is being treated under general anesthesia, what are you most concerned about?"

In contrast, there was a significant association between parents' education and answers to "If your child is being treated under general anesthesia, what are you concerned about?" wherein parents with higher education levels had greater concerns about the complications of GA. There was also a significant association ($p < 0.05$) between parents' education and concerns about the need for intravenous lines and cannula. Parents' concerns were not significantly associated with a history of prior GA ($p > 0.05$).

TABLE 1. Demographic and clinical variables by children and parents.

Variables	N	%
Parent-related:		
Relationship with the child:		
Father	22	6.9
Mother	294	92.2
Others	3	0.9
Total	319	100.0
Age (years):		
20–29	70	21.9
30–39	180	56.5
40–49	66	20.7
≥50	3	0.9
Total	319	100.0
Educational level:		
Primary school	24	7.5
Middle school	25	7.8
High school	99	31.0
Undergraduate	157	49.3
Postgraduate	14	4.4
Total	319	100.0
Have undergone general anesthesia before:		
Yes	146	45.7
No	173	54.3
Total	319	100.0
Children-related:		
Age (years):		
<3	53	16.6
3–6	189	59.3
6–9	66	20.7
>9	11	3.4
Total	319	100.0
Sex:		
Female	155	48.6
Male	164	51.4
Total	319	100.0
Child sequence:		
Youngest	98	30.7
Middle	98	30.7
The oldest	123	38.6
Total	319	100.0
Children have undergone general anesthesia before:		
Yes	35	10.9
No	284	89.1
Total	319	100.0

TABLE 2. The perceptions of parents on DGA.

Parents' perceptions	N	%
Q1: If your child is being treated under general anesthesia, what are you concerned about? Multiple answers are allowed.		
-General anesthesia complications	250	78.3
-Pre-operative fasting	58	18.2
-Intravenous lines and cannula	155	48.6
-Length of hospitalization	18	5.6
-Postoperative nausea and vomiting	108	33.9
-Postoperative throat pain	59	18.5
-Postoperative oral pain	164	51.4
-Death or coma	146	45.8
Q2: What methods would you suggest to decrease the anxiety of parents whose children are scheduled to be treated under general anesthesia? Multiple answers are allowed.		
-More explanation by doctors and nurses	193	60.5
-To be present at general anesthesia induction	189	59.2
-To be allowed to talk to parents whose children have undergone general anesthesia	46	14.4
Q3: What do you expect to be the outcome of the pediatric dental treatment under general anesthesia? Multiple answers are allowed.		
-Elimination of dental pain	281	88.1
-Improved esthetic	92	28.8
-Improved eating and feeding	133	41.6
-Improved sleep	66	20.7
Improved cooperation from children regarding dental care	46	14.4

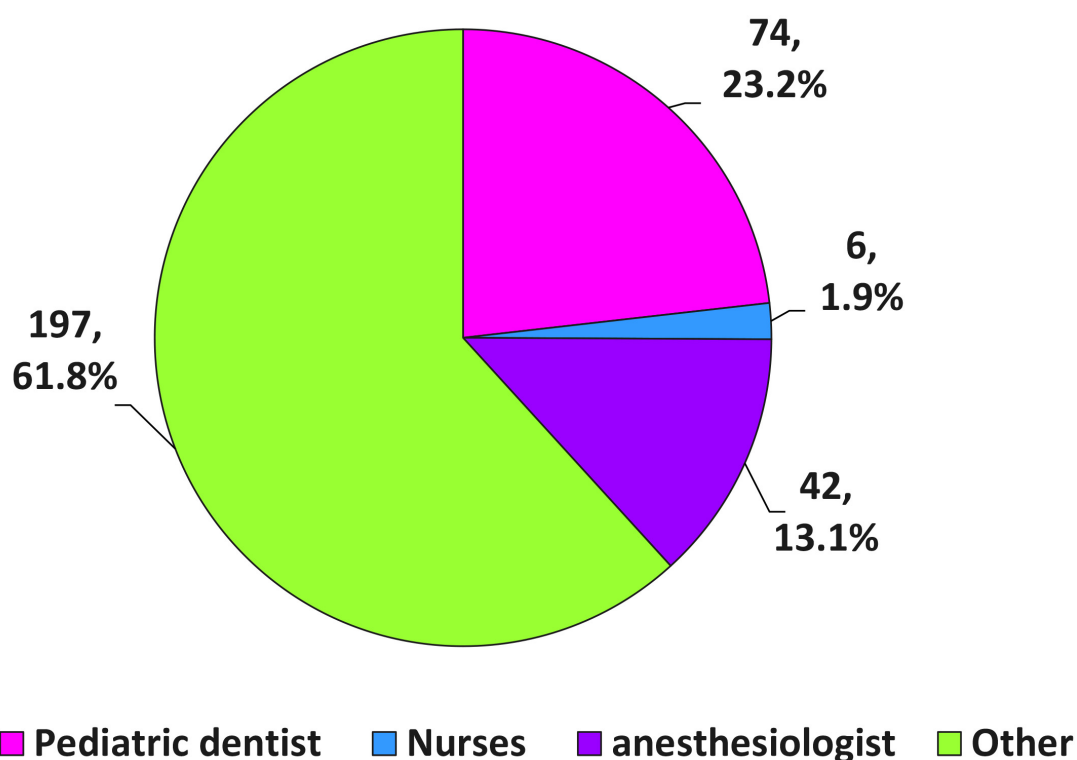
**FIGURE 1. Sources of Information about pediatric care under DGA from 319 parents.**

TABLE 3. Association between parents' factors and concerns about pediatric DGA.

Parent-related variables	General anesthesia complications	Pre-operative fasting	Intravenous lines and cannula	Length of hospitalization	Postoperative nausea and vomiting	Postoperative throat pain	Postoperative oral pain	Death or coma
Relationship with the child:								
Father	19 (7.6%)	2 (3.4%)	4 (2.6%)	0	8 (7.4%)	1 (0.3%)	11 (6.7%)	10 (6.8%)
Mother	230 (92.0%)	56 (96.6%)	149 (96.1%)	18 (100.0%)	98 (90.7%)	58 (98.3%)	151 (92.1%)	135 (92.5%)
Others	1 (0.4%)	0	2 (1.3%)	0	2 (1.9%)	0	2 (1.2%)	1 (0.7%)
<i>p</i> -value	0.11	0.361	*0.0011	*0.0001	0.463	0.148	0.862	0.909
Age (years):								
20–29	51 (20.4%)	15 (25.9%)	28 (18.1%)	7 (38.9%)	22 (20.4%)	14 (23.7%)	37 (22.6%)	28 (19.2%)
30–39	143 (57.2%)	36 (62.1%)	89 (57.4%)	8 (44.4%)	59 (54.6%)	32 (54.2%)	94 (57.3%)	86 (58.9%)
40–49	53 (21.2%)	6 (10.3%)	35 (22.6%)	2 (11.1%)	25 (23.1%)	12 (20.3%)	31 (18.9%)	31 (21.2%)
≥50	3 (1.2%)	1 (1.7%)	3 (1.9%)	1 (5.6%)	2 (1.9%)	1 (1.7%)	2 (1.2%)	1 (21.2%)
<i>p</i> -value	0.503	0.17	0.121	*0.043	0.533	0.894	0.824	0.692
Educational level:								
Primary school	16 (6.4%)	2 (3.4%)	11 (7.1%)	0	3 (2.8%)	4 (6.8%)	12 (7.3%)	6 (4.1%)
Middle school	14 (5.6%)	1 (1.7%)	18 (11.6%)	2 (11.0%)	9 (8.3%)	2 (3.4%)	13 (7.9%)	12 (8.2%)
High school	68 (27.2%)	24 (41.4%)	38 (24.5%)	7 (38.9%)	30 (27.8%)	16 (27.1%)	47 (28.7%)	46 (31.5%)
Undergraduate	138 (55.2%)	30 (51.7%)	80 (51.6%)	8 (4.4%)	60 (55.6%)	35 (59.3%)	88 (53.7%)	72 (49.3%)
Postgraduate	14 (5.6%)	1 (1.7%)	8 (5.2%)	1 (5.6%)	6 (5.6%)	2 (3.4%)	4 (2.4%)	10 (6.8%)
<i>p</i> -value	*0.000	0.071	*0.034	0.695	0.119	0.419	0.296	0.093
Have undergone general anesthesia before:								
Yes	120 (48.0%)	31 (53.4%)	83 (53.5%)	12 (66.7%)	49 (45.4%)	31 (52.5%)	72 (43.9%)	75 (51.4%)
No	130 (52.0%)	27 (46.6%)	72 (46.5%)	6 (33.3%)	59 (54.6%)	28 (47.5%)	92 (56.1%)	71 (48.6%)
<i>p</i> -value	0.128	0.895	0.812	0.067	0.919	0.247	0.491	0.065

*Statistically significant at 5% level.

TABLE 4. Association between children-related variables and parents' concerns about pediatric DGA.

Children related variables	General anesthesia complications and side-effects	Pre-operative fasting	Intravenous lines and cannula	Length of hospitalization	Postoperative nausea and vomiting	Postoperative throat pain	Postoperative oral pain	Death or coma
*Age (years):								
<3	41 (16.4%)	14 (24.1%)	27 (17.4%)	7 (38.9%)	21 (19.4%)	5 (8.5%)	35 (21.3%)	22 (15.1%)
3–6	143 (57.2%)	37 (63.8%)	92 (59.4%)	8 (44.4%)	60 (55.6%)	41 (69.5%)	86 (52.4%)	90 (61.6%)
6–9	55 (22.0%)	7 (12.1%)	30 (19.4%)	3 (16.7%)	21 (19.4%)	10 (16.9%)	40 (24.4%)	26 (17.8%)
>9	11 (4.4%)	0	6 (3.9%)	0	6 (5.6%)	3 (5.1%)	3 (1.8%)	8 (5.5%)
<i>p</i> -value	0.183	0.054	0.911	0.066	0.336	0.156	*0.007	0.176
*Gender:								
Female	130 (52.0%)	26 (44.8%)	72 (46.5%)	6 (33.3%)	56 (51.9%)	28 (47.5%)	82 (50.0%)	78 (53.4%)
Male	120 (48.0%)	32 (55.2%)	83 (53.5%)	12 (66.7%)	52 (48.1%)	31 (52.5%)	82 (50.0%)	68 (46.6%)
<i>p</i> -value	*0.020	0.526	0.458	0.182	0.404	0.847	0.604	0.112
*Child sequence:								
Youngest	79 (31.6%)	19 (32.8%)	53 (34.2%)	9 (50.0%)	35 (32.4%)	18 (30.5%)	57 (34.8%)	43 (29.5%)
Middle	73 (29.2%)	24 (41.4%)	45 (29.0%)	4 (22.2%)	27 (25.0%)	13 (22.0%)	43 (26.2%)	48 (32.9%)
Eldest	98 (39.2%)	15 (25.9%)	57 (36.8%)	5 (27.8%)	46 (42.6%)	28 (47.5%)	64 (39.0%)	55 (37.7%)
<i>p</i> -value	0.526	0.058	0.425	0.189	0.275	0.195	0.133	0.74
*Child has undergone general anesthesia before:								
Yes	27 (10.8%)	13 (22.4%)	21(13.5%)	6 (33.3%)	15 (13.9%)	10 (16.9%)	20 (12.2%)	18 (12.3%)
No	223 (89.2%)	45 (77.6%)	134(86.5%)	12 (66.7%)	93 (86.1%)	49 (83.1%)	144 (87.8%)	128 (87.7%)
<i>p</i> -value	0.852	*0.002	0.152	*0.002	0.233	0.104	0.472	0.476

*Statistically significant at 5% level.

Regarding children-related variables (Table 4), there was an association ($p < 0.05$) between children's age and responses to "if your child is being treated under general anesthesia, what are you concerned about?". Parents were more concerned about postoperative pain in younger children. Moreover, children's sex was significantly associated ($p < 0.05$) with DGA concerns. Specifically, parents showed greater concerns for a female child. For children who had undergone GA before, we observed a significant association between prior GA history and parents' concerns regarding the need for pre-operative fasting and length of hospitalization ($p < 0.05$).

When asked about "Where did you obtain your information on dental treatment under GA?" most parents chose "Internet and social media" ($n = 232$, 62%), followed by "Pediatric dentist" ($n = 84$, 23%). Fig. 1 shows the different sources of information about DGA.

The parents' suggestions for decreasing their anxiety are presented in Table 5 according to their demographic data. We observed a statistically significant difference between parents who had not undergone GA before and those who had undergone GA with the need for more explanation by doctors and nurses and the desire to be present during GA induction ($p < 0.05$).

The parents' suggestions to decrease their anxiety on pediatric dental care under GA are presented according to the children's demographic data in Table 6. There was no significant difference between the decrease in anxiety related to their child's DGA among parents with and without prior history of GA ($p > 0.05$).

4. Discussion

Since pediatric dental care is a stressful experience for parents, especially when it requires GA [16, 18], this study investigated parents' perceptions about DGA for their children. Aldossari *et al.* [19] reported that parents who previously underwent GA described it as a vivid and unpleasant experience. In this current study, most parents showed concerns about DGA. Two other studies demonstrated that parents who took their children for dental treatment under GA were concerned and apprehensive about the treatment and wary of the potential complications [16, 20]. The maximum responses were to non-serious concerns such as postoperative pain and the need for intravenous lines.

Other stressful factors related to care under GA included the need for pre-operative fasting, intravenous lines and cannula, postoperative pain, and the recovery period [16, 18, 20]. Cost was not a factor in this study because patients were treated in a governmental hospital free of charge. In addition, parents might be under more pressure than usual if their children were to be subjected to treatment under GA because they do not consider dental treatment an emergency or life-saving procedure, although they knew the severity and extent of dental care needed [16]. In this study, the parents expressed concerns on more serious complications such as coma or death.

Previous studies indicated that educating parents regarding the risks and benefits of GA could decrease their anxiety and enable them to make better decisions about their children's treatment [21]. Despite the protocol of explaining the risks of

pediatric care under DGA during the informed consent process for parents, 24% of the parents in this study indicated that they obtained information about DGA risks and benefits from the pediatric dentist, while only 13% received this information from the anesthesiologist. This result raises questions about whether parents are being adequately informed during DGA screening visits and may explain why most parents suggested that they needed more explanation by doctors and nurses to reduce their anxiety.

However, studies have shown that the parent's presence during anesthesia induction did not decrease their anxiety levels but significantly increased parental satisfaction [22]. Moreover, parents in our study suggested that being present during DGA induction could help lower their anxiety about pediatric DGA.

Dental care under GA can improve the long-term quality of life and general health of children who need it [11, 12, 23]. El Batawi *et al.* [24] further described that DGA could eliminate oral pain and had a significantly positive impact on children's eating and sleeping behaviors. In this study, parents reported the need for more explanation from doctors and nurses and the desire to be present during DGA induction despite their children's prior exposure to GA.

Some studies also reported that dental treatment under GA had a positive psychological impact on treated children [11, 12]. Aldossari *et al.* [19] observed that Saudi children who had undergone dental treatment under GA were at a higher risk for dental anxiety even several years after GA. Despite these long-term effects, most parents in our study described that they expected the treatment to eliminate their children's dental pain; hence, they were seemingly unaware of the potential long-term impacts of dental treatment under GA on the quality of life of the treated children.

This study had several limitations. First, parents were interviewed one week before the scheduled DGA, and this timing could have influenced the parents' concern levels. Second, the questionnaire presentation, wherein parents had to choose one answer from various response items, may have caused concern among parents about topics that would otherwise not have been of concern to them. Third, in situations where both parents were present, convenience sampling was used to decide which parent would respond to the questionnaire. Fourth, this was a single-center study, so the results are limited in their generalizability.

Overall, parents should be offered increased education and awareness before their children are referred to DGA, which could include information on the risks, benefits and expected short- and long-term outcomes of DGA. Further, multicenter studies are needed to validate these findings considering all the concerns and limitations of the current study.

5. Conclusions

This study highlights that the major concerns of Saudi parents regarding pediatric care under DGA were related to its potential complications and indicated that parents need more education regarding the risks, benefits and expected outcomes of DGA for their children when the latter are referred to such treatments requiring DGA.

TABLE 5. Suggested methods to decrease the anxiety of parents regarding pediatric DGA based on parents'-related variables.

Parent-related variables	More explanation by doctors and nurses	To be present during general anesthesia induction	To be allowed to talk to parents whose children have undergone general anesthesia
Relationship with the child:			
Father	14 (7.3%)	10 (5.3%)	1 (2.2%)
Mother	178 (92.2%)	177 (93.7%)	45 (97.8%)
Others	1 (0.5%)	2 (1.1%)	0
Age (years):			
20–29	34 (17.6%)	46 (24.3%)	14 (30.4%)
30–39	119 (61.7%)	98 (51.9%)	22 (47.8%)
40–49	37 (19.2%)	43 (22.8%)	10 (21.7%)
≥50	3 (1.6%)	2 (1.1%)	0
Educational level:			
Primary school	9 (7.1%)	11 (5.8%)	0
Middle school	13 (6.7%)	11 (5.8%)	4 (8.7%)
High school	58 (30.1%)	63 (33.3%)	18 (39.1%)
Undergraduate	98 (50.8%)	93 (49.2%)	20 (43.5%)
Postgraduate	9 (4.7%)	11 (5.8%)	4 (8.7%)
Have undergone general anesthesia before:			
Yes	79 (40.9%)	98 (51.9%)	22 (47.8%)
No	114 (59.1%)	91 (48.1%)	24 (52.2%)
<i>p</i> -value	*0.032	*0.009	0.762

TABLE 6. Suggested methods to decrease the anxiety of parents regarding pediatric dental care under general anesthesia by children-related variables.

Children related variables	More explanation by doctors and nurses	To be present during general anesthesia induction	To be allowed to talk to parents whose children have undergone general anesthesia
Age (years):			
<3	38 (19.7%)	31 (16.4%)	8 (17.4%)
3–6	113 (58.5%)	112 (59.3%)	30 (65.2%)
6–9	39 (20.2%)	37 (19.6%)	6 (13.0%)
>9	3 (1.6%)	9 (4.8%)	2 (4.3%)
Sex:			
Female	86 (44.6%)	92 (48.7%)	31 (67.4%)
Male	107 (55.4%)	97 (51.3%)	15 (32.6%)
Child sequence:			
Youngest	62 (32.1%)	60 (41.3%)	13 (28.3%)
Middle	62 (32.1%)	51 (27.0%)	15 (32.6%)
Eldest	69 (35.8%)	78 (41.3%)	18 (39.1%)
Children have undergone general anesthesia before:			
Yes	19 (9.8%)	23 (12.2%)	6 (13.0%)
No	174 (90.2%)	166 (87.8%)	40 (87.0%)
<i>p</i> -value	0.425	0.409	0.827

AUTHOR CONTRIBUTIONS

JA—designed the research study. SA—performed the research. RA and PPJ—analyzed the data. JA, PPJ and FSA—wrote the manuscript. All authors read and approved the final manuscript.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

This descriptive cross-sectional study was conducted at the King Saud Medical City (KSMC), Riyadh, Saudi Arabia. The study was approved by the KSMC institutional review board (IRB Log No. 19–486). The study protocol followed the Declaration of Helsinki ethical standards for research involving human subjects and the STROBE guidelines. Informed consent was obtained from all participants before enrolment in the survey.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

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