

ORIGINAL RESEARCH

Association between children's dental anxiety and parental acceptance of dental general anesthesia: a cross-sectional study

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Abstract

Background: This cross-sectional study was to explore associations between children's dental anxiety (CDA) and parental acceptance of Dental General Anesthesia (DGA) in Chongqing, China and to provide relevant clinical recommendations. **Methods:** The study was conducted among 743 parent-child couples. Demographic characteristics, DGA knowledge of parents and parental acceptance of DGA was collected by a self-designed questionnaire. CDA was measured by the Chinese version of the Modified Dental Anxiety Scale (MDAS). **Results:** More than 70% of the parents were unwilling to accept DGA. After controlling demographic factors, DGA knowledge of parents (odds ratio (OR) = 1.23, 95% confidence interval (CI): 1.12–1.35), parents' having heard of DGA (OR = 1.23, 95% CI: 1.12–1.35), and children's experience of general anaesthesia (GA) was more likely (OR = 1.23, 95% CI: 1.12–1.35) to promote parents to accept DGA. Compared to parents of children with medium anxiety (OR = 0.58, 95% CI: 0.36–0.94), parents of children with high or no CDA were more likely to accept DGA. Among children with high CDA, girls' parents (OR = 2.77; 95% CI: 1.27–6.09), parents whose children had GA experience (OR = 18.78, 95% CI: 4.5–78.05) and fathers with clerical or skilled workers occupation (OR = 3.59, 95% CI: 1.08–11.93) were more likely to accept DGA than others, however, mothers with freelance work (OR = 0.13, 95% CI: 0.03–0.53) and families with low monthly annual household income (<¥5000) were less likely to accept DGA than others. **Conclusions:** These findings might inform the development of targeted interventions to manage children's dental anxiety.

Keywords

Child; Parent; General anesthesia; Dental anxiety; Acceptance

1. Introduction

Children's dental anxiety (CDA) refers to a feeling or anticipation that something will happen, combined with a sense of losing control of dentistry. CDA may lead to behaviour management problems [1] and there existed a valid demonstrable path of association between parental socioeconomic status, dental anxiety, childhood dental anxiety, oral health behaviors and children's oral health-related quality of life (OHRQoL) [2]. The prevalence of CDA varies from 6.3% [3] to 93.8% [4] based on differences in age, region, culture and evaluation method. In 2019, the prevalence of CDA in children aged 3–12 years was nearly 55% in Chongqing, China [5]. When treating children with behaviour management problems caused by CDA, practitioners tend to consider non-pharmacologic behavioral management techniques (BMTs) in advanced [6], through which about 80% of pediatric patients could be cooperative in previous study [7]. If such strategy proves to be unsuccessful, conscious sedation and dental general anaesthesia (DGA) can be considered.

DGA is a controlled state of unconsciousness in which protective reflexes are lost [8]. It is the practitioner's compelled way to treat a child's dental problem when other options are insufficient. CDA has been demonstrated to be the most common self-reported and parent-reported factor leading to DGA [9, 10]. However, less was known about the association between CDA and parental acceptance of DGA. Understanding this association is critical to practitioners because childhood is a developmental period marked by biopsychosocial immaturity, with children holding a minimal role, conversely, parents play a major role in decision making at treatment [11]. However, some studies suggest that children should be encouraged to participate in healthcare decisions, because they desire voicing their preferences and choosing how treatments are administered to them [12, 13]. Especially for children's dental behaviour, there was a valid demonstrable path of association among parenting style, parental economic status, dental anxiety, childhood dental anxiety, oral health behaviors, and dental caries and dental visit behaviour [14]. Therefore, when a child is recommended to undergo DGA, how a child's emotion

particularly CDA influences parents' decision is essential to explore.

DGA was first brought to mainland China in 1999 [15], which led to low parental acceptance and was primarily affected by parent's DGA cognition [16]. Some findings concerning parental acceptance and educational level, culture background, and socioeconomic status are controversial [17, 18]. Although these studies show some insights into CDA between the parental acceptance of DGA, some gaps remain in understanding. Firstly, whether parents of children with higher CDA were more likely to accept DGA requires further assessment. Secondly, DGA is commonly recommended to children with high CDA, so the factors influencing the acceptance of DGA by parents of children with high CDA warrants exploration.

The present study aimed to test the hypothesis that parents of children with high CDA were more likely to accept DGA than parents of children with medium CDA. Gaining such knowledge can help practitioners provide advice and intervention from parents and children's perspectives, which may mitigate the negative effects of CDA on children's oral health.

2. Materials and methods

2.1 Methods

This study was a cross-sectional one conducted from July to September 2021, which was still during the COVID-19 pandemic. However, the number of dental visits did not decrease during this period owing to Chinese government's prevention and control policies. The participants were not limited to parents of children with DGA needs. The research team recruited all parents who accompanied their children in the waiting room of the Department of Pediatric Dentistry in the Stomatological Hospital of Chongqing Medical University (a public hospital, which offers DGA). As of this study, DGA has not been included in health insurance, which was not for free, the average total medical cost per tooth was ($\text{¥}842.97 \pm 148.07$) under DGA [19]. Specifically, prior to recruitment, the purpose of the study was explained to parents in detail by the investigator (a postgraduate of pediatric dentistry). The parent-child couple was selected in the study if their participation was voluntary and approved by the authorities. Participants obtained informed consents, including data security and a commitment that clinical personnel had no access to the data. This setup may prevent privacy breaches and problems with subsequent dental visits. The investigation questionnaire was in Chinese and completed using the mobile phone software WenJuanXing (www.wjx.cn) from a third-party survey company. In the process, when the parents encountered any problem, the investigator was responsible in explaining it to them.

According to the non-random sampling survey, the sample size was at least 10–20 times the number of variables [16]. Assuming that the questionnaire had 30 variables and an approximately 10% non-response rate, the estimated sample size was about 330–660. The inclusion criteria: Children aged 3–12 whose parents can use mobile apps were eligible for this study. The exclusion criteria: Given the focus on CDA and

DGA, this study excluded children with special health needs leading to DGA, children with a history of chronic disease (e.g., congenital heart disease, asthma and blood dyscrasias) or mental disorder and parent-child couples whose questionnaires were not completed in full. A total of 757 pairs of children and their parent(s) were recruited in this study.

2.2 Measures

Three studies were reviewed on complications and risks for DGA [20–22]. A questionnaire containing 25 items was compiled initially. Then, experts including dentists and anaesthesiologists (both with senior professional titles) were invited to evaluate the structure and content of the questionnaire. According to a face-to-face interview with the experts, some inappropriate items were deleted or modified and adjusted. Based on the content validity evaluation of the experts, a questionnaire with 23 items was designed. A pilot test was conducted via collecting 20 samples one month before the formal survey. All participating parents signed informed consent forms before the formal survey. In this pilot test, we found that parents would prefer choosing yes or no about whether to accept DGA to answering in details, so we decided to dichotomize the outcome. Reliability and validity tests were used, and the Cronbach's alpha coefficient of the questionnaire was 0.749. The Kaiser-Meyer-Olkin (KMO) validity statistical test (KMO = 0.858) and Bartlett sphericity test ($p < 0.0001$) were used.

2.3 Questionnaire

At the beginning of the survey, parents were asked to answer the following question: "Have you ever heard of dental general anaesthesia (DGA) for children? (Yes, I have; No, never)". The following questionnaire comprised four parts. The first three were completed from parents, and the fourth was either children self-administered or completed with assistance from parents. Parents who assisted the children were directed to answer questions from the perspective of the children.

2.3.1 Characteristic information of parents and their children

i: Information about children including age, gender, sibling(s), birth order; dental visits; and history of DGA; and ii: information about the respondents (father or mother), main caregivers, occupation and education of parents, parenting style and annual household income.

2.3.2 Evaluation of DGA knowledge of parents

Parents were asked about the risks and complications of DGA. Regarding the complications of pediatric dental treatment under general anaesthesia (GA), the parents were asked, "Which of the following complication(s) do you think children are likely to happen following DGA?". Six answers were provided, including five correct answers, and "I do not know". Regarding the risks of GA, the parents were asked: "Which of the following statements do you think is true regarding the risks of DGA?". Five answers were provided, including one true and four false.

2.3.3 Investigation of parental acceptance of DGA

Parents were asked: “Were you willing to refer children for DGA in the situation where the child was NOT cooperative enough to complete the dental treatment?”. The answer was yes or no.

2.3.4 Chinese version of the Modified Dental Anxiety Scale (MDAS)

MDAS was used to assess the CDA level. The Chinese MDAS comprised two factors: anticipatory dental anxiety and treatment dental anxiety. Internal consistency coefficients (tau non-equivalent) were 0.74 and 0.86, respectively [23]. MDAS comprised five questions, each with five identical options: non-anxiety (1 point), mild anxiety (2 points), anxiety (3 points), very anxiety (4 points) and extreme anxiety (5 points). The total score ranged from 5 to 25. A higher score indicated a more serious situation of anxiety, which was divided into three degrees: no dental fear (1 point), medium level (2–3 points) or severe level (4–5 points).

2.4 Variables

The variables were demographic, clinical characteristics and family-related information. Additional variables related to parental cognitive ability and acceptance about DGA were included. MDAS was used to assess the CDA level. Demographic variables included age (≤ 6 or > 6 years old), gender (boy or girl), siblings (yes or no), and birth order (first, second or third). Clinical characteristics included experience of GA (yes or no), dental visits (first, second or third or more). Family-related information included caregivers (parents or others), respondents (mother or father), parent’s occupation (managerial or professional, clerical or skilled workers, labour or service, freelance work or others), parent’s education level (bachelor degree below, bachelor’s degree, master’s degree or above), monthly annual household income ($< ¥5000$, $¥5000–10,000$, $¥10,001–20,000$ or $> ¥20,000$), parenting style (authoritative, authoritarian or permissive), parental acceptance about DGA (yes or no), and CDA level (no dental fear, medium level or high level).

2.5 Statistical analysis

Data were analyzed using Stata version 17.1 software (Stata, College Station, TX, USA). Descriptive statistics such as frequencies of the distributions of all variables were computed to provide an overview of the findings. The dental anxiety score of children was measured on the ordinal scale and categorized into three levels. The chi-square test was used for a one-way analysis of parental acceptance between groups. Mann-Whitney U-test was used to compare the mean score of DGA knowledge of parents in different groups. Three different multiple logistic-regression models were used to assess the association between children’s dental anxiety and acceptance of DGA by controlling demographic factors as confounders in the analysis of all subjects. Model 1 adjusted for anxiety. Model 2 was further adjusted for parental knowledge of DGA. Model 3 was further adjusted for the number of visits, GA experience

of children, and DGA hearing history of parents. Results are presented as odds ratio (OR) and 95% confidence interval (CI). A p -value of 0.05 was set as the level of significance.

3. Results

A total of 743 (98.15%) of all parent-child couples completed the questionnaire; the other 14 couples were excluded from data analysis, owing to missing more than two questions. Table 1 shows the characteristics of the participants in this study. More than half of the children were girls (52.62%) and from single-child families (57.07%). The population of children aged 7–12 years was twice that of children who aged 3–6. The majority of caregivers (86.68%) were parents. More than two-thirds of the pediatric patients in the research visited a dentist more than one time. Only less than 10% of the children had a GA experience. More than two-thirds of the respondents were mothers, 64.06% of whom reported providing a permissive parenting style to their children. Approximately, half of the parents in this survey had a bachelor’s degree. Over half of the families had a monthly annual household income of more than $> ¥10,000$. More than one-third of parent(s) had never heard of DGA before participating in the survey. Except for the mother’s occupation, no statistically significant difference was found in the demographic characteristics.

Significant differences existed between dental anxiety level and children’s ages and their visit time(s) ($p < 0.05$). The share of children scoring the lowest anxiety level in 7–12 years (53.8%) was significantly higher than that in 3–6 years (42.4%). Moreover, the proportion of children with the highest CDA level was 42.79% on the first visit, which was much higher than the proportion on the second visit (22.22%) and more visit(s) (22.11%). These data revealed that children’s age and visit time(s) were strongly correlated with CDA level (Fig. 1).

The distributions of parental answers to their DGA knowledge were described in Table 2. Among the six answers regarding the complications of DGA for children, the percentages of correct answers ranged from 10.23% to 24.76%. About 40.38% of respondents chose the answer “I do not know”, and only 5.25% answered all questions correctly. Regarding the risks of DGA, only 14.54% parents believed that DGA cannot irreversibly damage the brain. Notably, 89.91% knew that the child may have conditions such as pain when they received DGA. The total scores for DGA knowledge ranged from 0 to 9, with a mean of 2.341 and a standard deviation of 1.826. The proportion of score 1–2 was the most concentrated (52.76%).

Further analysis on parental knowledge scores were shown in Fig. 2. The mean score of mothers was higher than that of fathers. A higher respondents’ education level corresponded with a higher mean score. The mean score of the respondents with the lowest monthly income had the lowest mean score of parental knowledge.

CDA levels, children’s experience of GA, and DGA knowledge of parents in parental acceptance of DGA were shown in Table 3. In Model 1, parents whose children with medium CDA were less likely to accept DGA compared with parents whose children had high CDA (OR1 = 0.58; 95% CI: 0.36–0.94). After adding the DGA knowledge score of parents,

TABLE 1. Characteristics information of participants.

	Total	Whether accept DGA or not		<i>p</i> -value
	N = 743	No (N = 524)	Yes (N = 219)	
Information about the pediatric patients:				
Age (yr)				
3–6	290 (39.03%)	204 (38.93%)	86 (39.27%)	0.930
7–12	453 (60.97%)	320 (61.07%)	133 (60.73%)	
Gender				
Boy	352 (47.38%)	244 (46.56%)	108 (49.32%)	0.490
Girl	391 (52.62%)	280 (53.44%)	111 (50.68%)	
Caregivers				
Parents	644 (86.68%)	455 (86.83%)	189 (86.30%)	0.850
Others	99 (13.32%)	69 (13.17%)	30 (13.70%)	
Siblings				
No	424 (57.07%)	311 (59.35%)	113 (51.60%)	0.052
Yes	319 (42.93%)	213 (40.65%)	106 (48.40%)	
Birth order				
First	601 (80.89%)	426 (81.30%)	175 (79.91%)	0.760
Second	133 (17.90%)	91 (17.37%)	42 (19.18%)	
Third	9 (1.21%)	7 (1.34%)	2 (0.91%)	
Dental visit(s)				
1st	201 (27.05%)	141 (26.91%)	60 (27.40%)	0.190
2nd	108 (14.54%)	84 (16.03%)	24 (10.96%)	
≥3 times	434 (58.41%)	299 (57.06%)	135 (61.64%)	
Children's experience of GA				
Yes	67 (9.02%)	19 (3.63%)	48 (21.92%)	<0.001*
No	676 (90.98%)	505 (96.37%)	171 (78.08%)	
Information about respondents:				
Respondents				
Father	217 (29.21%)	153 (29.20%)	64 (29.22%)	0.990
Mother	526 (70.79%)	371 (70.80%)	155 (70.78%)	
Father's occupation				
Managerial or professional	115 (15.48%)	76 (14.50%)	39 (17.81%)	0.330
Clerical or skilled workers	322 (43.34%)	224 (42.75%)	98 (44.75%)	
Labor or service	81 (10.90%)	63 (12.02%)	18 (8.22%)	
Freelance work or others	225 (30.28%)	161 (30.73%)	64 (29.22%)	
Mother's occupation				
Managerial or professional	165 (22.21%)	102 (19.47%)	63 (28.77%)	0.046*
Clerical or skilled workers	271 (36.47%)	196 (37.40%)	75 (34.25%)	
Labor or service	71 (9.56%)	51 (9.73%)	20 (9.13%)	
Freelance work or others	236 (31.76%)	175 (33.40%)	61 (27.85%)	
Education level of father				
Bachelor degree below	261 (35.13%)	189 (36.07%)	72 (32.88%)	0.530
Bachelor degree	368 (49.53%)	259 (49.43%)	109 (49.77%)	
Master degree and above	114 (15.34%)	76 (14.50%)	38 (17.35%)	

TABLE 1. Continued.

	Total	Whether accept DGA or not		p-value
	N = 743	No (N = 524)	Yes (N = 219)	
Education level of mother				
Bachelor degree below	296 (39.84%)	216 (41.22%)	80 (36.53%)	0.490
Bachelor degree	362 (48.72%)	249 (47.52%)	113 (51.60%)	
Master degree and above	85 (11.44%)	59 (11.26%)	26 (11.87%)	
Monthly annual Household income (yuan, RBM)				
<¥5000	58 (7.81%)	43 (8.21%)	15 (6.85%)	0.240
¥5000~10,000	224 (30.15%)	153 (29.20%)	71 (32.42%)	
¥10,000~20,000	269 (36.20%)	200 (38.17%)	69 (31.51%)	
>¥20,000	192 (25.84%)	128 (24.43%)	64 (29.22%)	
Parenting style				
Authoritative	40 (5.38%)	27 (5.15%)	13 (5.94%)	0.880
Authoritarian	227 (30.55%)	162 (30.92%)	65 (29.68%)	
Permissive	476 (64.06%)	335 (63.93%)	141 (64.38%)	
Parents' having heard of DGA				
Yes	474 (63.80%)	308 (58.78%)	166 (75.80%)	<0.001*
No	269 (36.20%)	216 (41.22%)	53 (24.20%)	

DGA: Dental General Anesthesia; GA: general anaesthesia.

*: The difference was significant.

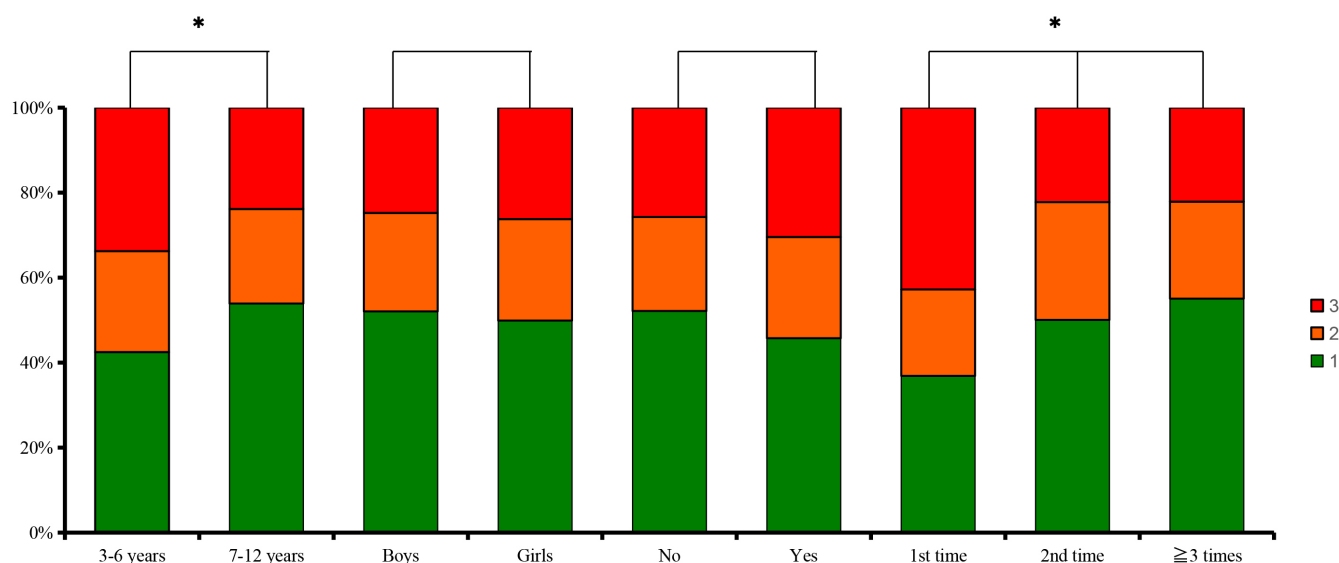


FIGURE 1. Distribution of Children's dental anxiety (n = 743). Note: 1—None anxiety; 2—Mild to moderate anxiety; 3—Severe anxiety. *: The difference was significant.

dental visits, parents' having heard of DGA and children's experience of GA, smaller likelihoods of reluctance were found (OR₂ = 0.56; OR₃ = 0.55; $p < 0.05$) in models 2 and 3. In all models, parents who had higher DGA knowledge scores (OR₃ = 1.23; 95% CI: 1.12–1.35), who had heard of DGA (OR₃ = 1.52; 95% CI: 1.03–2.25), and whose children had experience of GA were more likely (OR₃ = 7.34; 95% CI: 3.98–13.52) to accept DGA.

The analysis results of influencing factors on parental acceptance of DGA whose children had high CDA are presented in Table 4. Interestingly, the parents whose children with GA experience (OR = 18.78; 95% CI: 4.52–78.05) were more likely to accept DGA. Other factors including higher DGA knowledge score of parents (OR = 1.03; 95% CI: 0.85–1.24), parents' having heard of DGA (OR = 1.46; 95% CI: 0.66–3.27), and more dental visits (>3) of children (OR = 0.85; 95%

TABLE 2. Distribution of DGA knowledge of parents (n = 743).

	Frequency (n)	Percentage (%)
Which of the following complication(s) do you think children are likely to happen following DGA?		
(1) Postoperative pain	178	23.96%
(2) Weariness or emergence delirium (ED)	115	15.48%
(3) Fever	76	10.23%
(4) Nausea or vomiting	181	24.36%
(5) Mild drowsiness	184	24.76%
(6) I do not know	300	40.38%
Which of the following statements do you think is true regarding the risks of DGA?		
(1) Irreversible damage to the brain		
True	635	85.46%
False	108	14.54%
(2) Irreversible damage to faculty of memory		
True	662	89.10%
False	81	10.90%
(3) Postoperative complication(s) such as pain		
True	668	89.91%
False	75	10.09%
(4) Irreversible damage to neurocognitive function		
True	661	88.96%
False	62	11.04%
(5) Irreversible damage to mastication and growth		
True	657	88.43%
False	86	11.57%

Note: A score of 1 was given for each correct answer to a question, and a score of 0 was given for the wrong answer. The DGA knowledge score range from 0 to 10, with higher scores indicating better knowledge of DGA. Right answers were written in bold. DGA: Dental General Anesthesia.

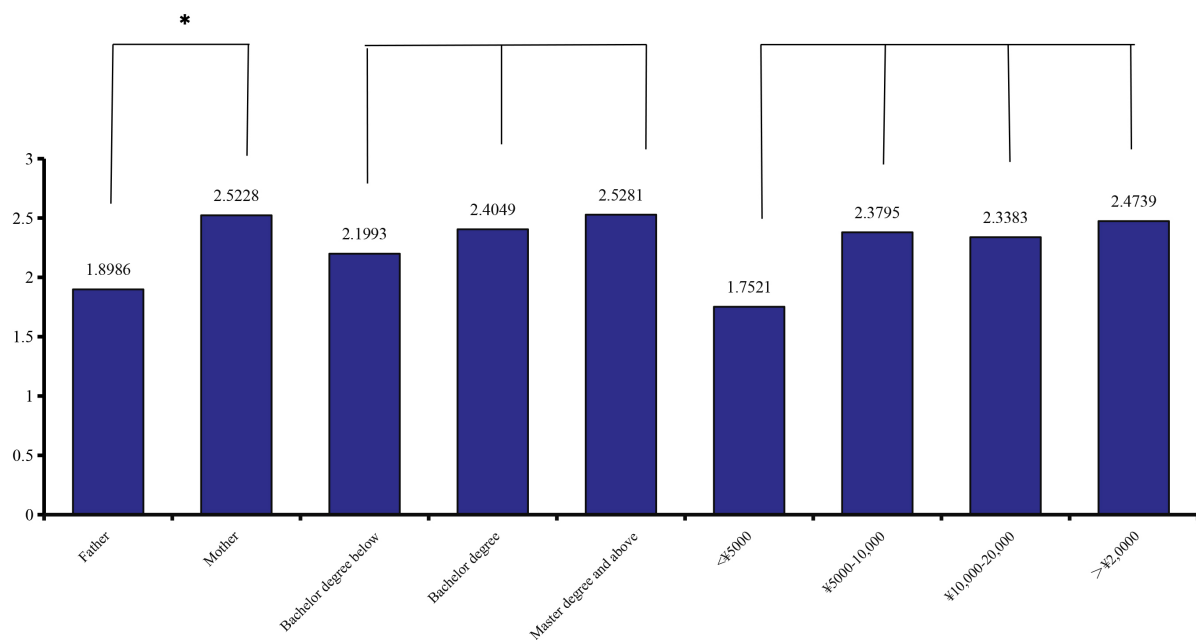


FIGURE 2. Mean score of DGA knowledge of parents. *: The difference was significant.

TABLE 3. The logistic regression analysis for parents' acceptance of DGA (n = 743).

	Model 1	Model 2	Model 3
The acceptance of DGA	OR (95% CI)	OR (95% CI)	OR (95% CI)
CDA			
High level	Ref.	Ref.	Ref.
Medium level	0.58 (0.36–0.94)*	0.56 (0.35–0.91)*	0.55 (0.33–0.91)*
No dental fear	0.92 (0.63–1.35)	0.94 (0.63–1.38)	0.97 (0.65–1.47)
DGA Knowledge score	/	1.25 (1.14–1.36)*	1.23 (1.12–1.35)*
Dental visit(s)			
First time	/	/	Ref.
Second time	/	/	0.51 (0.28–0.94)*
More than 3 times	/	/	0.83 (0.54–1.28)*
Parents' having heard of DGA			
No	/	/	Ref.
Yes	/	/	1.52 (1.03–2.25)*
Children's experience of GA			
No	/	/	Ref.
Yes	/	/	7.34 (3.98–13.52)*

*Note: $p < 0.05$. All the models have adjusted the gender, age, siblings, birth order, caregivers, participants of parents, education level of parents, parental occupation; monthly annual household income, and parenting style. OR: odds rate; CI: confidence interval; DGA: Dental General Anesthesia; GA: general anaesthesia; CDA: Children's dental anxiety; Ref.: Reference.

CI: 0.36–2.00) were not significant. Moreover, girls' parents (OR = 2.77; 95% CI: 1.27–6.09), fathers with clerical or skilled occupation (OR = 3.59; 95% CI: 1.08–11.93), and parents with higher household income (OR = 11.69; 95% CI: 1.46–93.93) were more likely to accept DGA. However, mothers whose occupations were clerical or skilled workers (OR = 0.28; 95% CI: 0.10–0.80) and freelance work or others (OR = 0.13; 95% CI: 0.03–0.53), were less likely to accept DGA even though their children were reported to have high CDA.

4. Discussion

More than one-third of parents had never heard about DGA before in this study, which was similar to the previous study [24]. Surprisingly, the mean score of mothers was significantly higher than that of fathers, either because mothers might have acquired some knowledge of GA during pregnancy or delivery period [25] or highlights that in Chinese domestic and medical concerns of the child are still mostly provided by the female caregiver [26], which was the same in Germany [11]. A larger cohort with more male participants in the future may give better understanding of parental acceptance of DGA.

Furthermore, despite only sevoflurane-based DGA did not affect neurocognitive function in children adversely [27], a common misunderstanding that more than 85% parents insisted the DGA irreversibly damage children's brain. Positively, 90% of parents understood the postoperative complications of DGA, though they may feel confused about the specific items, which may be beneficial to reduce conflicts between practitioners and parents. These results indicated that

practitioners should minimise or even eliminate the risk of adverse events by following AAPD (the American Academy of Pediatric Dentistry) guidelines [28] to promote parents' confidence in DGA, in addition to increasing public awareness and cognition of CDA and DGA.

Parents of children with medium CDA were less likely to accept DGA than parents of children with high or no CDA in this study. The reason may be that parents of children with medium CDA believe their child's compliance should improve with age and increased visits. As a result, the parents of these children with medium CDA may prefer non-pharmacological BMT to pharmacological BMT [29] and may result in some children neither cooperate via BMT nor receive dental treatment under DGA timely, leading to more severe oral disease eventually [30]. For practitioners, to reduce this vicious cycle, delaying (or deferral) treatment in uncooperative children especially for those without urgent treatment needs. In support of this conjecture, alternative treatment options like nitrous oxide inhalation sedation have been shown to be more accepted by parents than GA [29]. The use of fluoride and frequent control plaque removal and minimally invasive treatment methods (such as non-restorative caries management and indirect pulp coverage) by dentists may meet the expectations of these families.

Among parents of children with high CDA, the results suggested that children's GA experience was significantly associated with parental acceptance of the DGA, rather than the parents' DGA knowledge and parents' having heard of CDA. This may be because they have known the benefits of the DGA beforehand [11]. Higher household income was more likely to promote parental acceptance of the DGA. It was suggested for

TABLE 4. Logistic regress analysis for parents' acceptance of DGA whose children with high CDA.

Parental acceptance of DGA	Subgroups	OR	p-value
Parents' DGA knowledge score	/	1.03 (0.85, 1.24)	0.79
Child's dental visit(s)	First time	1	1
	Second time	0.35 (0.09, 1.41)	0.14
	More than 3 times	0.85 (0.36, 2.00)	0.71
Parents' having heard of DGA	No	1	1
	Yes	1.46 (0.66, 3.27)	0.35
Children's experience of GA	No	1	1
	Yes	18.78 (4.52, 78.05)	<0.001*
Age (yr) of child	3–6	1	1
	7–12	0.88 (0.39, 2.01)	0.76
Gender of child	Boy	1	1
	Girl	2.77 (1.27, 6.09)	0.01*
Caregivers	Parents	1	1
	Most were grandparents	2.08 (0.72, 5.98)	0.18
Siblings of child	No	1	1
	Yes	1.65 (0.68, 4.04)	0.27
Birth order of the child	The first	1	1
	The second	0.63 (0.21, 1.90)	0.41
	The third and above	1.78 (0.06, 50.07)	0.74
Respondents	Father	1	1
	Mother	0.98 (0.43, 2.24)	0.95
Education level the of father	Bachelor degree below	1	1
	Bachelor degree	0.35 (0.11, 1.14)	0.08
	Master degree and above	0.50 (0.09, 2.76)	0.43
Education level of the mother	Bachelor degree below	1	1
	Bachelor degree	1.76 (0.47, 6.62)	0.40
	Master degree and above	1.23 (0.20, 7.43)	0.82
Father's occupation	Managerial or professional	1	1
	Clerical or skilled workers	3.59 (1.08, 11.93)	0.04*
	labor or service	0.38 (0.04, 3.71)	0.41
	Freelance work or others	4.46 (1.00, 19.97)	0.05

TABLE 4. Continued.

Parental acceptance of DGA	Subgroups	OR	p-value
Mother's occupation	Managerial or professional	1	1
	Clerical or skilled workers	0.28 (0.10, 0.80)	0.02*
	labor or service	5.46 (0.53, 56.67)	0.156
	Freelance work or others	0.13 (0.03, 0.53)	<0.001*
Monthly annual household income	<¥5000	1	1
	¥5000~10,000	10.11 (1.42, 72.01)	0.02*
	¥10,000~20,000	6.10 (0.81, 45.82)	0.08*
	>¥20,000	11.69 (1.46, 93.93)	0.02*
Parenting style	Authoritative	1	1
	Authoritarian	0.95 (0.17, 5.44)	0.95
	Permissive	0.32 (0.06, 1.85)	0.20

OR: odds rate; DGA: Dental General Anesthesia; GA: general anaesthesia. *: The difference was significant.

policy-makers that DGA's partial inclusion should be in the scope of medical reimbursement to reduce medical costs for some low-income families.

Emotional factors influencing parental perception of GA have been discussed in several studies [30, 31]. Interestingly, children's gender may also be associated with parental DGA acceptance in children with high CDA. The results showed that parents of high CDA girls were more likely to accept the DGA than parents of high CDA boys, which may be related to parents' perception that boys may be braver. To some extent, it was suggested that when parents of children with high CDA made a decision on whether or not to accept the DGA, the daughter's emotion may affect the parents more than the son's.

Another interesting finding was a difference between fathers and mothers of children with high CDA in deciding on their children's DGA: fathers with clerical or skilled occupations were more likely to accept DGA than mothers with the same occupations. This finding was similar to previous research that parents may consider differently when making DGA decisions for their children [32]. Fathers may be more sensible to think that DGA was the appropriate way to relieve the pain of children with high CDA. When recommending DGA to parents whose children were uncooperative owing to high CDA, practitioners should focus on parental acceptance, especially low-income families, and boys' parents with non-skilled occupations. Non-pharmacological BMT should be tried/applied for children with high CDA before considering DGA or attempting to convince parents to choose DGA. If CDA does not resolve DGA is for sure indicated.

However, considering the limitations of this cross-sectional study, the results should be interpreted with caution. Firstly, the cross-sectional design cannot explain the causal relationship between CDA and parental acceptance of DGA. Future prospective research studies are needed to validate these findings. Secondly, owing to the large sample size of this work, the

presence of CDA was reported by parents, which may cause an inaccurate determination of CDA. If possible, the children themselves should evaluate CDA. Thirdly, the acceptance of DGA was assessed through questionnaires, which may have caused recall bias. The dichotomy of parental acceptance may reduce the sensitivity of the results. Additionally, it was hard to check the oral health status of the child, which may affect parental awareness and acceptance of DGA. Further targeted surveys are necessary in the future.

5. Conclusions

Further education on DGA was considered to be necessary. Parents of children with medium CDA were less likely to accept DGA than those with high or no CDA. Among parents of children with high CDA, mothers with freelance work and families with low household income were less likely to accept DGA than others. These might be a potential barrier to dental practitioners. When recommending DGA to parents whose children were uncooperative due to medium or high CDA, dental practitioners should be flexible in their implementation following AAPD guidelines.

AVAILABILITY OF DATA AND MATERIALS

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

AUTHOR CONTRIBUTIONS

WWL and LND—study design. LND—data collection, funds collection. TTW—statistical analysis. JDH and ZC—data interpretation. LND and TTW—manuscript preparation. JDH, YJY, LND and TTW—literature search. All authors contributed to the article and approved the submitted version.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

The studies involving human participants were reviewed and approved by Stomatological Hospital of Chongqing Medical University was obtained (CQHS-IRB-2021-29). Written informed consent to participate in this study was provided by the participants' legal guardian/next of kin. Guidelines documented in the Helsinki-2013 Declaration of experiments on humans were adopted for this study. Informed consent was obtained from the participants and their legal guardians. Prior to signing the consent form, all participants were informed that they could withdraw from this study at any stage without any penalty; and were invited to ask questions.

ACKNOWLEDGMENT

The authors thank all the children and their parents who participated in this study.

FUNDING

This study received funding from Chongqing Health Commission medical scientific research project (2016MSXM047).

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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How to cite this article: Tingting Wu, Weiwei Liu, Zhen Chen, Jindie Huang, Yujia Ye, Lina Dai. Association between children's dental anxiety and parental acceptance of dental general anesthesia: a cross-sectional study. *Journal of Clinical Pediatric Dentistry*. 2025; 49(2): 126-136. doi: 10.22514/jocpd.2025.032.