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Influence of Parental Dental Anxiety on Children's Oral Health Status – a Cross Sectional Survey

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Abstract:

Objective: Parental dental fear and anxiety (DFA) significantly influence adolescents' access to the dental care and their ability to maintain oral health. The study aimed to evaluate how dental anxiety of parents affects the oral health status of their children using the Index of Dental Anxiety and Fear "(IDAF)-4C+" scale.

Material and Methods: A cross-sectional survey was conducted among 111 parent-child pairs in the out patient department (OPD) of the Department of Pedodontics and Preventive Dentistry, Kalinga Institute of Dental Sciences, Bhubaneswar, Odisha (India). Children aged 6 -14 years and one of their parents were selected using convenient sampling for the study. An investigation was done to assess the impact of the dental anxiety of the parents on the oral health status of their children. A pre-tested questionnaire, "IDAF-4C+" was used to measure the dental anxiety and fear of the parents. Clinical examinations of the children were done using the World Health Organization (WHO) dentition status (2013). The STATA-14 was used for statistical analysis.

Results: 44% of the parents reported no or little, or low dental fear. Of the rest, 8% reported moderate dental fear and 4% reported high dental fear. Positive correlations were found between the dental fear, phobia symptom, and dental experience of the parents and the oral health status of their children (r_1=0.1254, r_2=0.1120, r_3=0.1829) for each of the 3 modules of the IDAF-4C+ (IDAF-4C, IDAF- P, IDAF-S) i.e. core, phobia and stimulus model respectively.

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Conclusion: The dental anxiety of a parent affects the oral health of their children. The IDAF-4C+ scale provides a comprehensive insight into the origins of dental anxiety and its impact on emotions, cognitive processes, and behaviour.

Keywords: dental anxiety, IDAF-4C, IDAF-P, IDAF-S, oral health status

Introduction

Dental fear or anxiety is defined as an abnormal fear or worry about dental procedures, and an irrational fear or apprehension about visiting the dentist for treatment or preventive measures. It poses a significant public health issue, with a prevalence rate of 9% in the field of pediatric dentistry[1]. Dental anxiety is a complex problem divided into two components: anxiety and fear. As per the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-V) and International Classification of Diseases, Tenth Revision (ICD-10), Dental anxiety (DA) is categorized as a dental phobia or "odontophobia" in its most severe manifestations, which can be debilitating or induce significant distress[2,3].

Studies have found that children's dental anxiety could be related to many internal factors and psycho-social factors. It has been reported that between 5.7% and 20.2% of children and adolescents experience high levels of dental anxiety[4]. There are complex reasons for dental anxiety or fear which can be largely categorized into situational, environmental, and personal factors[5]. As dental anxiety commonly originates in childhood and often persists into adulthood, psychosocial factors during childhood can have enduring effects on health in later stages of life[6]. Liddell suggested that elements like negative dental encounters also significantly contribute to the emergence of fear[7]. However, some patients still have dental fears even though they have not had any negative experiences. Endogenous factors, including genetic predisposition, personality traits, and differences in age and gender tend to increase susceptibility to dental anxiety and fear in such patients[8]. The progression of dental fear encompasses apprehension not just about pain, injections, or invasive procedures but also about unfamiliar environments and being separated from parents.

Dental fear presents a significant hurdle for pediatric dentists, often translating directly into challenges with managing their young patients' behaviour[9]. There is a direct association between higher levels of dental anxiety and poor oral health among adults. However, this link is less uncertain in children. Therefore, it is important to investigate links between dental anxiety and oral health during childhood and adolescence to improve oral health and dental experience. It is easier to start patients with the right dental attitudes than to attempt to change already existing values. Parents with children undergoing dental general anaesthesia (DGA) are often anxious about their child's reaction and the possibility of regaining consciousness. According to research, parents' preoperative anxiety negatively influences their child's recovery from anaesthesia by transmitting their anxiety and debilitating their mood. Anxiety among the parents substantially impacts the child's post-operation recovery[10].

There are various studies assessing parental anxiety and children's anxiety using many dental fear and anxiety scales such as the Children's Fear Survey Schedule-Dental Subscale (CFSS), Depression Anxiety Stress Scale (DASS), Modified Dental Anxiety Scale (MDAS), Corah Dental Anxiety Scale (CDAS) etc. A recently used scale, the IDAF-4C+ (Index of Dental Anxiety and Fear) scale which has been used previously to assess children's dental anxiety but not their parents.[11] Using the IDAF-4C+ scale to assess parental anxiety adds novelty to our study thus providing a more holistic understanding of the familial influence on dental anxiety. Understanding the impact of parental anxiety

on children's oral health can inform early intervention and preventive measures thus potentially breaking the cycle of dental anxiety across generations and ultimately promoting better oral health in children. Given the above, the present study aimed to assess dental anxiety among parents using the IDAF-4C+ and the oral health of children using the World Health Organization (WHO) Oral Health Assessment Form 2013. Using the IDAF-4C+ scale across diverse demographic groups, including parents, will help in drawing meaningful conclusions regarding the prevalence and severity of dental anxiety in families. This scale has been validated for assessing children's dental anxiety and comprehensively captures the various components of fear and anxiety, such as cognitive and behavioural aspects. Its psychometric properties make it a reliable tool for measuring dental anxiety across different age groups. The study also aimed to assess the influence of parental dental anxiety on their children's oral health status.

Material and Methods

Study setting: A cross-sectional study was conducted among 111 parent-child pairs in the out patient department (OPD) of the Department of Pedodontics and Preventive Dentistry, Kalinga Institute of Dental Sciences. This study was conducted for a period of 3 months, starting from March 2023 through May 2023. The relationship between the parents' dental anxiety and how it affected their children's oral health condition was investigated. Before starting the investigation, ethical clearance was obtained from the Kalinga Institute of Medical Sciences, Bhubaneswar, with ref. No: KIIT/KIMS/IEC/1315/2023.

Participation in the study was voluntary, and the parents gave informed consent before the questionnaire was administered. Information related to the survey was provided to the individual participants before the study began. The study included children aged 6-14 and their parents. Children with distinct indications of needing extractions, restorations, and oral prophylaxis were included. Children with any known systemic disorders or medical conditions were excluded from the study.

Data from a published study on the prevalence of dental anxiety in the indian population, which showed a 10% incidence of dental anxiety, were used to calculate the required sample size. Hence the required sample size was found to be 110 child-parent pairs. The convenience sampling method was used for selecting the study population.

The survey tool included various components, including sociodemographic characteristics (including age, education, gender, and income using the Kuppuswamy socioeconomic status scale, 2022)., childbirth order, and oral hygiene habits of the children. The WHO Oral Health Assessment Form 2013 for children was used to evaluate the children's oral health, and the "Index of Dental Anxiety and Fear" (IDAF-4C+) was utilized to evaluate parent's dental anxiety[11] (Figure 1).

The IDAF-4C+ questionnaire's internal consistency was found to be reliable, with a Cronbach's alpha coefficient of 0.94. Prior to the study, it was translated into the Odia language. An expert panel also examined its content validity. The questionnaire was pre-tested among 20 participants from the OPD to determine its face validity. A single investigator, accompanied by a skilled recording clerk, conducted all clinical examinations on the children. Twenty to thirty subjects were examined in one visit.

The IDAF-4C+ consists of three autonomous modules for assessment: 1) The "core "module "(IDAF-4C)", serving as the fundamental component for broader evaluation; 2) The "phobia" module "(IDAF-P)", applying DSM-IV diagnostic standards; and 3) the "stimulus" module "(IDAF-S)", which assesses anxiety levels triggered by particular oral stimuli. Each of theb four scientifically-based components of dental anxiety contains two items in an eight-item anxiety and fear module (IDAF-4C). It is used to quantify the degree of dental anxiety. A 5-point Likert-type scale is used for the responses, with five representing

The Index of Dental Anxiety and Fear (IDAF-4C+)

The following questions relate to how you feel about going to the dentist.

1. How much do you agree with the following statements?	Disagree	Agree a little	Somewhat agree	Moderately agree	Strongly agree
(a) I feel anxious shortly before going to the dentist.					
(b) I generally avoid going to the dentist because I find the experience unpleasant or distressing.					
(c) I get nervous or edgy about upcoming dental visits.					
(d) I think that something really bad would happen to me if I were to visit a dentist.					
(e) I feel afraid or fearful when visiting the dentist.					
(f) My heart beats faster when I go to the dentist.					
(g) I delay making appointments to go to the dentist.					
(h) I often think about all the things that might go wrong prior to going to the dentist.					

2. Do the following statements apply to you?	YES	NO
(a) Going to the dentist is actively avoided or else endured with intense fear or anxiety.		
(b) My fear of going to the dentist has been present for at least 6 months.		
(c) My fear, anxiety or avoidance of going to the dentist significantly affects my life in some way (dental pain, avoiding eating some foods, embarrassed or self-conscious about appearance of teeth or mouth, etc.).		
(d) I am afraid of going to the dentist because I am concerned I may have a panic attack (abrupt fear with sweating, pounding heart, fear of dying or losing control, chest pain etc.).		
(e) I am afraid of going to the dentist because I am generally highly self-conscious or concerned about being watched or judged in social situations.		

3. To what extent are you anxious about the following things when you go to the dentist?	Not at all	A little	Somewhat	Moderately	Very much
(a) Painful or uncomfortable procedures					
(b) Feeling embarrassed or ashamed					
(c) Not being in control of what is happening					
(d) Feeling sick, queasy or disgusted					
(e) Numbness caused by the anesthetic					
(f) Not knowing what the dentist is going to do					
(g) The cost of dental treatment					
(h) Needles or injections					
(i) Gagging or choking					
(j) Having an unsympathetic or unkind dentist					

Figure 1 Index of Dental Anxiety and Fear (IDAF-4C+)[11]

strong agreement and one representing disagreement. The average score for each of the eight elements determines the module's overall anxiety and fear score[12]. The five items in the phobia module (IDAF-P) are associated with phobic tendencies with the possible responses of "Yes" or "No". Following the DSM-IV, three items are designated as diagnostic specifiers for dental phobia. The phobia module focuses on functional impairment, distress regarding the degree of dental fear, and the conviction that the fear is excessive or unjustified, while the core module measures degrees of anxiety and fear. The remaining two items, 2d and 2e, screen the child for social anxiety and panic disorder, respectively. A mean score of 3 or above on the core fear module (IDAF-4C) is considered to meet the DSM-IV diagnostic requirements for notable fear. "No or little dental fear" (scoring range 1-1.5) was the mean full-scale score, "Low dental fear" (score 1.51-2.5), "Moderate dental fear" (scoring 2.51-3.5), and "High dental fear" (score >3.5) categories respectively. The 10-item stimulus module has a 5-point Likert scale response, with 1 representing "not at all" and 5 representing "very much." The items in this module belong to different aspects such as emotional (IDAF-4C-E), behavioral (IDAF-4C-B), physiological (IDAF-4C-P), and cognitive (IDAF-4C-C). These subscales assess feelings of fear or apprehension (emotional), avoidance behaviors (behavioral), physical reactions like increased heart rate (physiological), and negative thoughts related to dental visits (cognitive). Each subscale consists of specific items designed to evaluate different aspects of dental anxiety experienced by individuals[12]. The IDAF-P module assesses dental phobia using five yes/no items: three diagnose phobias per DSM-IV criteria (disruption, distress, irrationality), and two screens for comorbidities (panic disorder, social anxiety). Diagnosis criteria include affirmative responses to phobia items, absence of comorbidities, and high dental anxiety (IDAF-4C score ≥3). IDAF-S includes ten items rating anxiety caused during dental visits (scale: 1-5). Examples: painful procedures, embarrassment, lack of control. It aims to identify specific triggers of dental anxiety.

The categorization of oral health status used in the study was adapted from the WHO Oral Health Assessment Form 2013, as below:

The Oral Health Status categories of children are based on the following scoring criteria: the total number of carious and gingival bleeding teeth, where 1 (good) stands for 0-4 teeth; 2 (fair) stands for 5-9 teeth; 3 (poor) stands for 10-14 teeth; and 4 (very poor) stands for ≥15 teeth.

The categorization of questions from the IDAF-4C+was based on the following scoring criteria:

Mean score of Q1 categories of parents (Q1 refers to the 8 questions in the core module, IDAF-4C): where 1 stands for "No or little dental fear" (score range 1–1.5); 2 stands for "Low dental fear" (score range 1.51–2.5); 3 stands for "Moderate dental fear" (score range 2.51–3.5) and 4 stands for High dental fear (score >3.5).

The mean score of Q3 categories of parents: (Q3 refers to the 8 questions in the stimulus module) where 1 (very low) stands for a score range of 1–1.5 which indicates very low levels of negative dental experiences across all stimulus categories (Distressing or uncomfortable procedures, experiencing embarrassment or shame, feeling a lack of control over the situation, and so forth).(same as above).

The sum of Q2 of parents:(Q2 refers to the 8 questions in the phobia module) Here, a score of 0 (no phobia-related symptoms) means 0/5 phobia-related symptoms of disruption, distress, unreasonableness, panic disorder, or social anxiety; a score of 1 (very low) means 1 out of 5 phobia related symptoms of disruption, distress, unreasonableness, panic disorder, or social anxiety; a score of 2 (low) means 2 out of 5 phobia related symptoms of disruption, distress, unreasonableness, panic disorder, or social anxiety; a score of 3 (moderate) means 3 out of 5 phobia related symptoms of disruption, distress, unreasonableness, panic disorder, or social anxiety; and

a score of 4 or more (high) means 4 or 5 phobia related symptoms of disruption, distress, unreasonableness, panic disorder, or social anxiety.

The data were analyzed using the statistical software STATA-14. Descriptive analysis was done using frequency distribution. The relationship between parental dental anxiety and children's oral health outcomes was investigated using the chi-square test and Pearson correlation coefficient analysis. A probability value set at p-value<0.05 was considered statistical significant.

Results

A total of 111 parent-children pairs were included in the study. The mean age of the parents was 38.17±6.05 years, while the mean age of the children was 7.86±2.56 years. The socio-demographic variables of the parents (using a modified Kuppuswamy scale 2022), including education, occupation, and income, were calculated using descriptive statistics. The majority held a graduate degree, followed by professional or honours degrees, and then high school certificates. The majority belonged to the occupation category of Skilled Workers and Shop & Market Sales Workers, followed by Professionals, and then Technicians and Associate Professionals. The majority belonged to the INR 9232-27648 income level, followed by INR 46095-68961.

The IDAF-4C+ was used for the assessment of parental dental fear, phobia symptoms, and dental experiences to stimuli. Around 44% each belonged to the"no or little dental fear" or "low dental fear" categories 8% belonged to the "moderate dental fear"and 4% to the "high dental fear" categories (Figure 2). The majority belonged to the No or little dental fear and low dental fear categories. Approximately 79% of the parents did not have phobia-related symptoms of disruption, distress, unreasonableness, panic disorder, or social anxiety. About 11% of the parents had one of the five phobia symptoms of this set. Another 4% of parents had two of the five symptoms of phobias, while an additional 4% had three of the five symptoms of phobia. Only 2% of the parents had four of the five symptoms of phobia related to disruption, distress, unreasonableness, panic disorder, or social anxiety.

Table 1 shows the mean ages of the study parents and children.

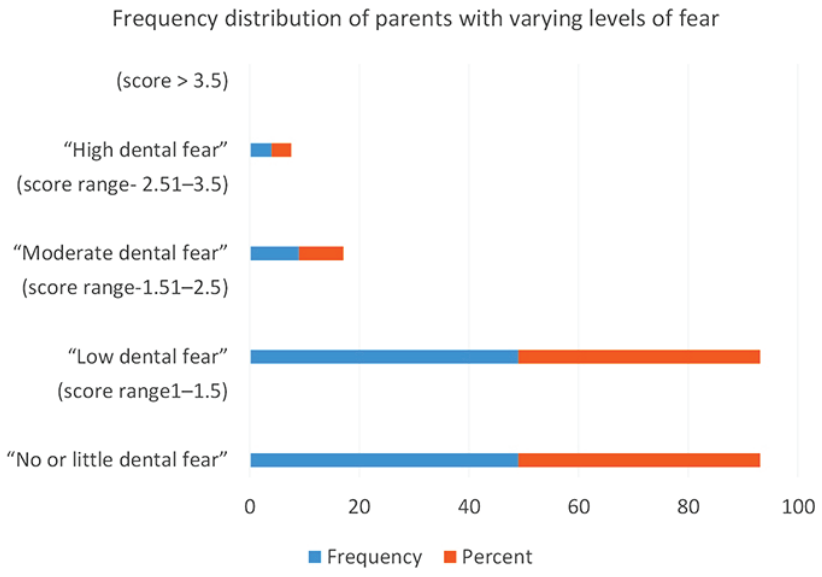

Figure 2 Frequency distribution of parents with varying levels of fear

Table 2 shows the socioeconomic distribution of the parents.

Table 3 shows that while patterns in the oral health status of children were observable across the different levels of parental dental fear and dental experience, the lack of statistical significance (p-values = 0.479 and 0.245) suggests that the identified associations were not firmly established.

Table 4 shows the observed patterns in oral health status across different sum categories of parental phobia-related symptoms; the non-significant p-value of 0.631 suggests that these associations are not statistically robust.

According to Table 5, the positive correlation between A and B suggests that, on average, as the mean score of parental dental fear Q1 increases, there is a slight tendency for the oral health status of their children to get poorer. However, the correlation was weak (0.1254), indicating that the relationship was not very strong.

A positive correlation coefficient of 0.1120 indicated a relatively weaker, linear relationship between the oral health status of the study children and the sum of Q2 of the parents. This positive correlation suggests that, on average, as the sum of parental responses related to phobia symptoms increased, there was a slight tendency for the oral health status of their children to become poorer.

The positive correlation suggests that, on average, as the mean score of parental responses to Q3 (distressing or uncomfortable procedures, experiencing embarrassment or shame, feeling a lack of control over the situation, and so forth increased, there was a slight tendency for the oral health status of their children to worsen. However, the correlation was weak (0.1829), indicating that the relationship was not strong.

Table 1 Mean age of study participants–parents and children

Variable	Mean (years)	Standard Deviation	Min	Max
Age of parents (N=111)	38.17	6.06	24	53
Age of children (N=111)	7.86	2.56	2	14

Table 2 Socioeconomic characteristics of study parents (N=111)

Education	n (%)	Occupation category	n (%)	Income category (INR)	n (%)
Illiterate	3 (2.7)	Unemployed	1 (0.9)	≤9226	11 (9.9)
Primary school certificate	7 (6.3)	Elementary occupation	10 (9.0)	9232–27648	29 (26.1)
Middle school certificate	9 (8.1)	Plant & machine operators and assemblers	4 (3.6)	27654–46089	18 (16.2)
High school certificate	16 (14.4)	Craft & related trade workers	15 (13.5)	46095–68961	28 (25.2)
Intermediate or diploma	10 (9.0)	Skilled agricultural & fishery workers	12 (10.8)	68967–92185	11 (9.9)
Graduate	43 (38.7)	Skilled workers and shop & market sales workers	21 (18.9)	92,191–184,370	2 (1.8)
Profession or honours	23 (20.7)	Clerks	5 (4.5)	≥184,376	12 (10.8)
		Technicians and associate professionals	18 (16.2)		
		Professionals	19 (17.1)		
		Legislators, senior officials & managers	6 (5.4)		
Total	111		111		111

n=number of parents, INR=Indian rupee

Table 3 Association between the oral health status of children and parental fear and level of negative dental experiences

Oral health status categories of children	Mean score of Q1 categories of parents n(%)				Total
	No or little dental fear	Low dental fear	Moderate dental fear	High dental fear	
Good	30 (48.4)	26 (41.9)	4 (6.5)	2 (3.2)	62
Fair	11 (39.3)	15 (53.6)	2 (7.1)	0 (0.0)	28
Poor	4 (28.6)	7 (50.0)	2 (14.3)	1 (7.1)	14
Very poor	4 (57.1)	1 (14.3)	1 (14.3)	1 (14.3)	7
Total	49 (44.1)	49 (44.1)	9 (8.1)	4 (3.6)	111
Pearson chi2(9)=8.5614 **Pr=0.479**					
Oral health status categories of children	**Mean score of Q3 categories of parents n(%)**				**Total**
	Very low negative dental experience	**Low negative dental experience**	**Moderate negative dental experience**	**High negative dental experience**	
Good	29 (46.8)	26 (41.9)	5 (8.1)	2 (3.2)	62
Fair	8 (28.6)	18 (64.3)	2 (7.1)	0 (0.0)	28
Poor	5 (35.7)	6 (42.9)	3 (21.4)	0 (0.0)	14
Very poor	3 (42.9)	2 (28.6)	1 (14.3)	1 (14.3)	7
Total	45 (40.5)	52 (46.8)	11 (9.9)	3 (2.7)	111
Pearson chi2(9)=11.4688 **Pr=0.245**					

Pr=pearson co-relation

Table 4 Association between the oral health status of children and parental phobia-related symptoms

Oral health status categories of children	Sum of Q2 of parents n (%)					Total
	No phobia related symptoms	Very low phobia related symptoms	Low phobia related symptoms	Moderate phobia related symptoms	High phobia related symptoms	
Good	48 (77.4)	8 (12.9)	3 (4.8)	2 (3.2)	1 (1.6)	62
Fair	26 (92.9)	1 (3.6)	0 (0.0)	1 (3.6)	0 (0.0)	28
Poor	9 (64.3)	2 (14.3)	1 (7.1)	1 (7.1)	1 (7.1)	14
Very poor	5 (71.4)	1 (14.3)	0 (0.0)	1(14.3)	0 (0.0)	7
Total	88 (79.3)	12 (10.8)	4 (3.6)	5 (4.5)	2 (1.8)	111
Pearson chi2(12)=9.8247 **Pr=0.631**						

Pr=pearson co-relation

Table 5 Pearson correlation between oral health status of children and parental responses to IDAF-4C+ questionnaire

	Oral health status of children	Mean score of Q1 of parents
Oral health status of children	1.0000	
Mean Q1 score of parents	**0.1254**	1.0000
	Oral health status of children	Sum of Q2 of parents
Oral health status of children	1.0000	
Sum of Q2 of parents	**0.1120**	1.0000
	Oral health status of children	Mean score of Q3 of parents
Oral health status of children	1.0000	
Mean score of Q3 of parents	**0.1829**	1.0000

Discussion

The findings of the study suggest that parental dental fear may have an impact on the oral health of their children. This impact is due to the fact that the children of parents who miss dental appointments or checkups or report child behaviour management problems due to fear or for other reasons are more prone to dental caries[13]. As found in our study, parental attributes such as disruption, distress, unreasonableness, panic disorder, or social anxiety have negative effects on the oral health status of their children. One study had comparable findings, indicating a mutual anxiety between parents/guardians and their children. This suggests that parents could have a significant impact on the development of anxiety and fear in children[14]. Previous research has indicated a negative relationship between preschoolers' oral health related quality of life (OHRQoL) and dental anxiety in their parents[15–17].

Parental dental fear and child dental fear have been found to be significantly correlated in a study done by Peretz et al[18] however, the strength of this link varies depending on the parameters chosen and the age of the children. A study also found that people who belonged to a higher socioeconomic class were generally more afraid of dental appointments, which was not clearly observed in the current study[19]. In a study conducted by Škrinjarić et al. at Zagreb, a positive correlation of 0.38 (utilizing the CDAS scale) was observed in the connection between the dental experience and the anxiety levels of both primary and secondary school-aged children and their mothers[20], which was similar to this study which found that as the education level of the parents increased the oral health status of the child decreased, though this correlation not statistically significant (correlation coefficient=–0.491, p–value=0.154). This weak association could be due to the heterogeneous population and the smaller sample size of our study. ICD–10–based specific phobia assessment was not performed on any of the participants, which was one of the study's limitations.

In this study, the children visiting the OPD of the Department of Pedodontics and Preventive Dentistry of Kalinga Institute of Dental Sciences during a 3–month period were included, owing to limited resources. This potentially may have led to selection, sampling and sampling timeframe biases, which in turn may limit the interpretations of the study to wider geographical areas or for children without any oral health complaints or other age groups. Given adequate resources, a more inclusive and longer–duration study may be planned to increase the validity and generalizability of the study results. Despite the lack of significant results, the observations in the study provide valuable insights regarding the effects of parental dental anxiety on their children's oral health status, which may be further evaluated using a more robust methodology.

Conclusion

This study highlights the influence of parental dental fear on their children's oral health. Attributes like disruption, distress, social anxiety, and dental experiences of stimuli such as distressing or uncomfortable procedures, experiencing embarrassment or shame, feeling a lack of control over the situation, and so forth in parents were associated with a higher risk of poorer oral health status in their children, although our findings did not confirm a clear link between them. The diverse population and small sample size may have influenced this outcomes of the study and there is a need for further research with a larger, more homogeneous population. However, this IDAF–4C scale can help the dental clinician to understand the level of dental anxiety among the patients and thereby improve oral health for both child and parent.

Recommendations

Intervention Programs: Develop targeted interventions for parents with dental anxiety and fear, focusing on regular dental check–ups and behaviour management to enhance their children's oral health.

Educational Initiatives: Conduct educational initiatives to help parents understand the value of preventative care and routine dental examinations for their children. Implementing these recommendations can contribute to effective strategies for improving children's oral health by addressing the impact of parental dental fear and related factors.

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