The Prevalence of Dental Fear and Its Relationship to Dental Caries and Gingival Diseases Among School Children

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Abstract: Background: Dental fear is a significant public health concern that impacts oral health, particularly in children. This study investigates the prevalence of dental fear among school children aged 7–13 years and its relationship to dental caries and gingival diseases.

Methods: A cross-sectional study was conducted involving 250 children (125 boys and 125 girls) from rural schools. Data collection included a modified Dental Fear Survey questionnaire and clinical oral health examinations assessing dental caries using the DMFT/dmft index and gingival health using the Gingival Index (GI). Statistical analyses evaluated correlations between dental fear and oral health indicators.

Results: Approximately 30.8% of children exhibited high dental fear, with girls reporting higher fear levels than boys. Children with high dental fear had significantly worse oral health outcomes, as indicated by higher mean DMFT/dmft scores (3.8 ± 1.2) and GI scores (2.2 ± 0.8) compared to those with low fear (2.1 ± 0.9 and 1.3 ± 0.6, respectively; $p < 0.01$).

Conclusion: Dental fear is prevalent among school children and correlates with poorer oral health, particularly higher rates of dental caries and gingival diseases. Targeted interventions, including positive reinforcement and preventive dental care, are essential to mitigate dental anxiety and improve oral health outcomes in children.

Keywords: Dental Fear, Oral Health in Children, Dental Caries and Gingival Diseases.

1. Introduction

Dental anxiety refers to a heightened state of awareness or reaction to a perceived threat, whereas dental fear is a specific type of phobia that influences an individual's emotional response to a distressing stimulus. This reaction is often rooted in the subconscious mind (1). Historically, children have often associated dental visits with negative experiences, fostering

anxiety and fear. This has led to behaviors that hinder their ability to adjust to clinical settings and deter timely dental treatment. Research by Beena et al. identifies dental fear as the fourth most common phobia (2). Many countries recognize dental fear in children as a significant public health concern (3,4). This issue presents challenges for both patients and dental practitioners, as it can lead to neglected oral health care (4,5). Studies show that the effects of dental fear in childhood can persist into adolescence, resulting in either avoidance of dental care or uncooperative behavior during treatment (6). Consequently, it is essential for dental professionals to identify children with dental anxiety early and implement suitable pediatric care techniques (7,8).

Good oral health has been highlighted as one of the top ten global health indicators, alongside areas such as nutrition, cancer, HIV, and heart disease. It facilitates fundamental activities like speaking, smiling, eating, and social interaction, contributing to personal and societal well-being. Neglected oral health can lead to costly, painful, and debilitating conditions. Early and accurate dental care is critical to mitigating these outcomes. Oral health significantly impacts overall health, medical expenses, and quality of life. Despite its importance, oral health often goes undervalued and neglected. Increasing evidence connects poor dental health with systemic conditions such as diabetes, Alzheimer's disease, and other chronic illnesses. Bridging the gap between the dental and medical fields is crucial to reducing the risk of such conditions and improving overall health outcomes.

According to Milgrom et al., conditioning plays a major role in the development of dental anxiety in children and adolescents (9). Negative dental experiences in childhood, unfavorable family attitudes, and prior traumatic dental treatments are potential contributors to this anxiety. Collectively referred to as "dental fear and anxiety" (DFA), these symptoms have been found to vary across different communities and populations (1). Studies report that dental fear prevalence ranges between 4% and 43% in various groups (10). Children with higher levels of dental caries are often more anxious, possibly due to prior negative experiences with dental care. This fear can lead to noncompliance with treatment plans, resulting in increased plaque accumulation, bleeding gums, and poor gingival health. Fearful individuals often avoid preventive dental practices, necessitating extensive dental interventions and exacerbating oral health issues (11,12).

1. Previous research has explored the connection between dental fear and oral diseases, but most studies have focused on adolescents or adults (3-5). Furthermore, limited research has examined the impact of dental fear on gingival health (4).

2. Materials and Methods

This study gathered data from children aged seven to 13 years attending schools. The study focused on this age group to address gaps in existing research on dental anxiety among school-aged children. Four schools were selected randomly from rural areas using stratified sampling to ensure representation. Participants were required to live within a 30-kilometer radius of the schools. Teachers were actively involved in assisting the children throughout the process, which was supervised by a trained pediatric dentist to ensure accuracy and comfort.

A total of 250 students (125 boys and 125 girls) were included in the study using stratified random sampling.

Study Criteria

Inclusion Criteria

- Children aged seven to 13 years who had minimal prior exposure to dental treatment but had accompanied others to dental visits.
- Students with the ability to comprehend and respond to a questionnaire.

Exclusion Criteria

- Children with systemic illnesses, cognitive impairments, or physical disabilities.

- Students undergoing current dental treatments.

Data Collection

Questionnaire

A modified version of the Dental Fear Survey (DFS) by Kleinknecht et al. was utilized, consisting of a 12-item questionnaire designed to evaluate dental anxiety. Children rated their fear level on a five-point Likert scale: 1 (not afraid) to 5 (extremely afraid). The questionnaire covered various aspects of dental visits, including the sight of dental tools, hearing the drill, sitting in the dental chair, and experiencing local anesthesia. Scores ranged from 12 to 60, with higher scores indicating greater anxiety. Children categorized as "high fear" scored above 40, while those below 40 were considered "low fear." Teachers distributed the questionnaires under supervision, and doubts were clarified by a translator to accommodate language barriers. The entire process took approximately 20 minutes.

Clinical Examination

After the questionnaire, a trained examiner conducted a dental assessment at the schools. A portable dental chair and a mobile dental unit were used for the evaluations. Natural daylight and a flashlight ensured sufficient visibility for oral examinations. The DMFT index was employed to assess dental caries in permanent teeth, while the decayed, missing, and filled teeth (dmft) index was used for primary teeth. Gingival health was evaluated using the Loe and Silness Gingival Index (GI) by examining six reference teeth.

Data Analysis

The collected data were analyzed using the Statistical Package for the Social Sciences (SPSS), Version 26.0 (IBM Corp., Armonk, NY). Descriptive statistics, including means and standard deviations, were calculated for DFS, DMFT, and GI scores. Relationships between demographic variables and anxiety levels were assessed using the Chi-squared test. Pearson's correlation test was applied to determine the association between dental fear and the prevalence of dental caries and gingival diseases. A p-value of less than 0.05 was considered statistically significant for all analyses.

3. Results

This study included 250 schoolchildren, evenly divided into 125 boys and 125 girls. Their demographic characteristics, dental fear levels, and oral health indicators, including DMFT/dmft index scores and gingival health status, were analyzed. The results provide a comprehensive overview of the relationship between dental fear and oral health status.

Table 1: Demographic Characteristics of Participants

Characteristic	Boys (n=125)	Girls (n=125)	Total (n=250)	Percentage (%)
Age (years)				
7–9	48	52	100	40.0
10–11	56	50	106	42.4
12–13	21	23	44	17.6
Total	125	125	250	100.0

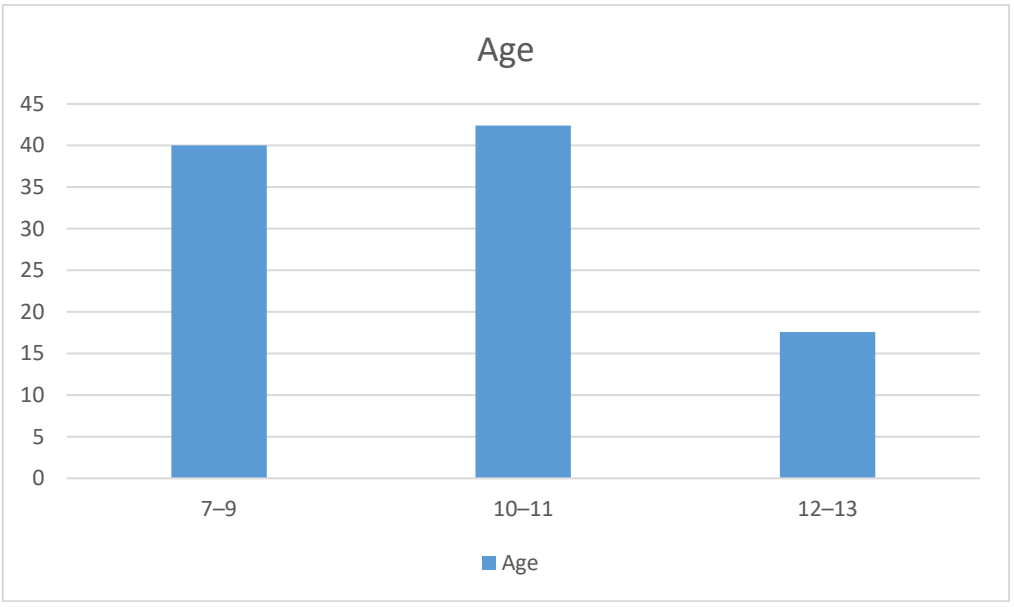

Fig 1: Age

The majority of the children (42.4%) were aged between 10 and 11 years, followed by those aged 7–9 years (40.0%). Only 17.6% of participants were in the older age group (12–13 years). There was a nearly equal distribution of boys and girls across all age groups, ensuring balanced representation.

Table 2: Distribution of Dental Fear Levels Among Participants

Fear Category	Boys (n=125)	Girls (n=125)	Total (n=250)	Percentage (%)
Low Fear (Score ≤40)	91	82	173	69.2
High Fear (Score >40)	34	43	77	30.8
Total	125	125	250	100.0

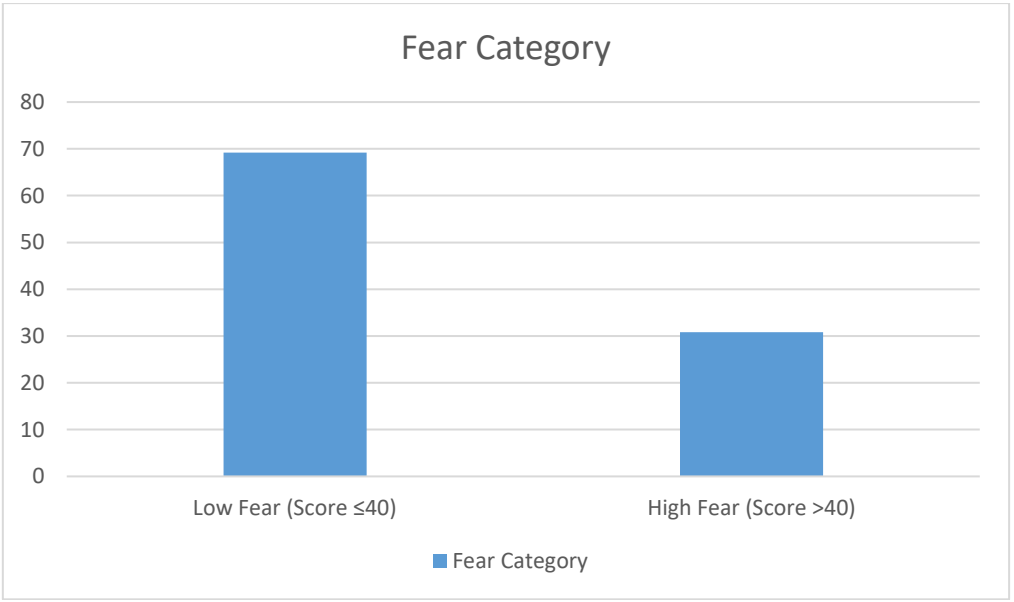

Fig 2: Fear Category

Approximately 69.2% of children reported low levels of dental fear, indicating that most participants were relatively comfortable with dental procedures. However, a significant proportion (30.8%) exhibited high levels of dental fear, with girls (43 participants) showing a slightly higher prevalence compared to boys (34 participants). This finding underscores the need for targeted interventions to address dental fear, particularly among female children.

Table 3: Correlation Between Dental Fear and Oral Health Indicators

Parameter	Low Fear Group (Mean ± SD)	High Fear Group (Mean ± SD)	p-value
DMFT/dmft Index Score	2.1 ± 0.9	3.8 ± 1.2	<0.01
Gingival Index Score (GI)	1.3 ± 0.6	2.2 ± 0.8	<0.01

Children with higher dental fear exhibited significantly worse oral health outcomes. The mean DMFT/dmft index score for the high-fear group (3.8 ± 1.2) was substantially higher than that of the low-fear group (2.1 ± 0.9), suggesting a correlation between dental fear and the presence of dental caries. Similarly, the gingival index scores indicated poorer gingival health in the high-fear group (2.2 ± 0.8) compared to the low-fear group (1.3 ± 0.6). The differences were statistically significant ($p<0.01$), highlighting the impact of dental fear on oral health.

4. Discussion

Pramila M. et al. evaluated dental anxiety in children aged 12–15 years using a single-item Dental Anxiety Question and assessed oral health through dental caries and gingivitis indices. Their findings indicated that 23.4% of children experienced severe dental anxiety, significantly linked to high mean MT scores. While many studies focus on the connection between dental anxiety and caries development, fewer explore its implications for gingival health. This study highlighted a strong association between dental fear and the presence of gingival bleeding (4, 11).

DQ Taani et al. examined the relationship between dental anxiety, caries, and gingivitis among students aged 12–15 years. Their research used the modified Kleinknecht's DFS questionnaire and oral health indices. Results indicated that 43% of participants had mild to moderate anxiety, while 10% showed extreme levels of fear. Consistent with our findings, girls reported higher anxiety than boys. However, no significant gender difference was observed in mean DMFT or GI scores (4).

NK Chellappah et al. assessed dental anxiety among school children aged 12–14 years, reporting an overall prevalence rate of 177 per 1000 children, with girls being 2.64 times more anxious than boys. This aligns with our observation that dental anxiety is more prevalent in females. Furthermore, accessibility to dental care was identified as a contributing factor to anxiety (3).

GS Prathima and colleagues investigated the prevalence of dental anxiety and its association with caries and gingival health in children aged 6–12 years. Their findings revealed a high prevalence of moderate to severe dental fear, ranging from 46% to 72%. Interestingly, no gender differences were observed in DMFT or gingival scores, and anxiety levels decreased with age. These results correlate with our findings, as we also observed a decline in fear scores as children grew older.

According to Kleinknecht RA et al., procedures involving needles and drills were the most feared aspects of dental visits (15). Similarly, our study identified injections and drills as major sources of anxiety. Research by Milgrom et al. suggested that fear formation occurs predominantly between ages 5 and 11, consistent with our findings that younger children reported higher levels of moderate and severe dental fear compared to older children (9). Bedi et al. noted that females tend to express dental fear more than males, a pattern also evident in our results, where males exhibited anxiety through alternative expressions like anger or frustration (5, 16).

Our study aligns with Kruger et al.'s suggestion that dental fear may predict caries risk. However, we found no significant association between dental fear and DMFT or gingival scores. Similarly, Schuller et al. reported no significant difference in DMFT scores between high and low anxiety groups, though individuals with high fear were more likely to opt for tooth extractions, perpetuating a cycle of anxiety-driven avoidance of dental care (19). This

underscores the importance of addressing dental fear early to prevent a cycle of neglect and invasive interventions.

Behavioral management is crucial in addressing dental anxiety in children. Pediatric dentists must assess fear levels before initiating treatment to tailor their approach to each child's needs. Implementing preventive measures like caries activity tests, fluoride application, and fissure sealants can minimize the need for invasive procedures. Regular oral health check-ups, parental education, and positive reinforcement can help reduce fear and promote a positive attitude toward dental care in children (3).

5. Study Limitations

Although significant associations were observed between dental fear and oral health in our study, certain limitations must be acknowledged. The study used a single-item measure for dental fear, which may not capture its multifaceted nature compared to multi-item scales like the Modified Dental Anxiety Scale or Corah's Dental Anxiety Scale. While the questionnaire demonstrated reliability and validity, it lacked the depth of psychometric assessments (10). Additionally, the cross-sectional design limits our ability to infer causality; a longitudinal cohort study would be necessary to establish cause-and-effect relationships (15).

6. Conclusions

Our findings highlight gender differences in dental fear, with females reporting higher anxiety levels. Dental fear scores decreased with age, suggesting that older children may develop coping mechanisms. There was no significant gender-based difference in DMFT or gingival scores, nor was there a clear link between dental fear and oral health indices. These findings emphasize the variability in individual responses to dental anxiety triggers. Addressing dental fear through positive reinforcement and desensitization techniques may improve dental attendance and oral health outcomes, particularly in children with severe anxiety. Ensuring a comfortable and pleasant dental experience can foster a positive attitude toward future dental care.

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