

## Association between Parental Dental Anxiety and Caries Experience in Children and Adolescents: A Systematic Review

Amir Yavari<sup>1</sup>, Sepehr Maghsoudloo<sup>2</sup>, Maryam Maghsoudloo<sup>3</sup> and Heidar Zohrehei<sup>3\*</sup>

<sup>1</sup>NYU Langone Health, Providence, RI, United States of America

<sup>2</sup>School of Dentistry, Centro Escolar University, Manila, Philippines

<sup>3</sup>Carr and Associates Dental Office, Boston, MA, United States of America

**\*Corresponding Author:** Heidar Zohrehei, Boston University, Boston, Massachusetts, United States of America.

**Received:** July 25, 2020; **Published:** August 29, 2020

### Abstract

**Background:** Dental caries critically impacts the health and development of children and adolescents. A growing amount of evidence suggests that parental dental anxiety is associated with the child's caries status. Having a better understanding of the caries experience among this population allows for identification of intervention strategies to improve their oral health.

**Purpose:** The aim of the present study was to investigate the relationship between parental dental anxiety and the caries experience of children and adolescents.

**Methods:** A search of studies in PubMed, Google Scholar, and Cochrane Library databases that tested the association of parental dental anxiety with dental caries index in children and adolescents was conducted in April 2020. Hand searches of the reference lists of the relevant articles were also performed.

**Results:** A total of 520 non-duplicated articles were identified by the literature search; relevance was determined by examining the title, abstract and body of the article. Four original research articles met the inclusion criteria. These articles were read and examined independently by two reviewers, and the relevant evidence was extracted for systematic review.

**Conclusion:** There was a significant relationship between parental dental anxiety and caries experience of the child. This result was consistent across the included studies from the current literature.

**Keywords:** Dental Anxiety; Dental Caries; Oral Health; Pediatric Dentistry

### Introduction

Dental caries remains a public health concern globally and is the most prevalent chronic health problem among children around the world [1,2]. A multitude of risk factors have been associated with the development of caries including frequent consumption of fermentable carbohydrates [3,4] poor oral hygiene and low socioeconomic status [5,6]. Despite the presence of many preventive and protective measures, dental caries remains a significant threat to the oral health-related quality of life (OHRQoL) of individuals [7]. The child's dental health is also influenced by the parental knowledge, beliefs and attitudes towards oral health [8-10]. OHRQoL of children and adolescents can be affected by many factors related to the mother. The psychological state of a mother, in particular, can affect the general and oral health of the child [7].

Anxiety has been defined as a "state of unpleasantness with associated fear of danger from within or a learned process of one's own environment" [11]. Dental anxiety is a very common disorder among the general population and a central issue of pivotal importance in

dental care. Dental anxiety has been reported to be the 5<sup>th</sup> most common fear by Agras, *et al.* [12] and its prevalence can be seen across all age groups. Previous studies have found a significant relationship between parental and child dental anxiety [13-15]. Parental dental anxiety has been linked to dental attendance pattern of children as well [16,17].

### Purpose of the Study

The purpose of this systematic review was to examine the association between parental dental anxiety and caries experience in children and adolescents.

### Methods

This review was prepared following PRISMA (Preferred Reporting Items for Systematic reviews and Meta-Analyses) guidelines [18].

#### Search strategy

A literature search of PubMed, Google Scholar, and Cochrane Library databases was conducted by two authors in April 2020. The terms used in the search included “parental dental anxiety”, “maternal dental anxiety”, “childhood caries”, “dental caries” and “caries status”. Using a reference management system, the duplicated articles were removed. The titles and abstracts of the articles were initially screened for relevance. If the title and abstract failed to provide sufficient information to determine eligibility, the full text was obtained and reviewed to assess for relevance. In order to ensure that no relevant studies were missed in the search, the reference lists of the relevant articles were then hand-searched and subsequently screened.

#### Selection criteria

Inclusion and exclusion criteria were specified prior to the study. No date or language restriction was applied during the search. Studies included in this systematic review required to (1) have non-syndromic children and adolescents (below 18 years old) as participants; (2) report parental dental anxiety using either Corah’s Dental Anxiety Scale (DAS) or Corah’s Modified Dental Anxiety Scale (MDAS); (3) report caries experience index of children and adolescents. Studies whose participants were adults were excluded. Studies that were not caries-specific or investigated trait anxiety rather than dental anxiety were also excluded from this review. Finally, review articles, authors’ replies and university theses were not included. Blinding of the articles was not performed regarding the journals published, authors, or institutions. All excluded studies at this stage were documented in an Excel spreadsheet (Excel 10, Microsoft Corp., Redwood City, Calif., USA), along with the reasons for exclusion. The final pool of remaining articles for full-text evaluation was then assessed for eligibility for qualitative review.

#### Data extraction

Data collection was performed independently by two reviewers for all the studies that met the inclusion criteria. The following data items were extracted: (1) publication information (journal, title, authors, date, and country); (2) sample characteristics (sample size, age and gender of the children); (3) dental anxiety scales and caries indices used; (4) outcome measures, and (5) qualitative results. Disagreements among the review authors in regards to data extraction was resolved through discussions.

#### Risk of bias in individual studies

The National Institute of Health (NIH) Quality Assessment Tool for Observational Cohort and Cross-Sectional Studies was used to assess risk of bias in individual studies [19]. Each study was assessed for clear presentation of the: (1) research question; (2) study population; (3) recruitment criteria; (4) justification of the sample’s size; (5) different levels of the exposure of interest; (6) exposure measures

and assessment; (7) existence of repeated measurements; (8) outcome measures and (9) adjustment of co-founders. Four criteria of the tool were not included in the assessment as all of the included studies were cross-sectional and these criteria would all be answered with a “no” or “non-applicable”. However, these criteria were included in the presentation of the risk of bias. Based on these criteria, two of the authors rated each study as good, fair, or poor. Studies rated as “fair” were considered to be of moderate risk for bias, while “good” rated studies were considered to be of low risk for bias.

## Results

### Study selection

A total of 553 articles were identified through the search of the databases (Figure 1). Following the removal of 33 duplicate articles, 454 studies irrelevant to the topic and 25 related to adults were excluded. The remaining 41 papers were considered for full-text assessment. Hand searching the reference lists of full-text articles did not result in any new additions to the remaining pool of studies to be evaluated. Few studies were published in a language other than English and were excluded after the translation of their title and abstract failed to meet the inclusion criteria. The reasons for exclusion of 37 articles at this stage were the following: 4 studies measured non-caries specific outcomes, 17 studies explored the association between parental dental anxiety and child’s dental anxiety, 11 studies looked at the impact of parental dental anxiety on child’s dental behavior, and 5 studies measured the trait anxiety of the parent rather than parental dental anxiety specifically. Finally, 4 studies were included in the qualitative assessment following full-text evaluation.

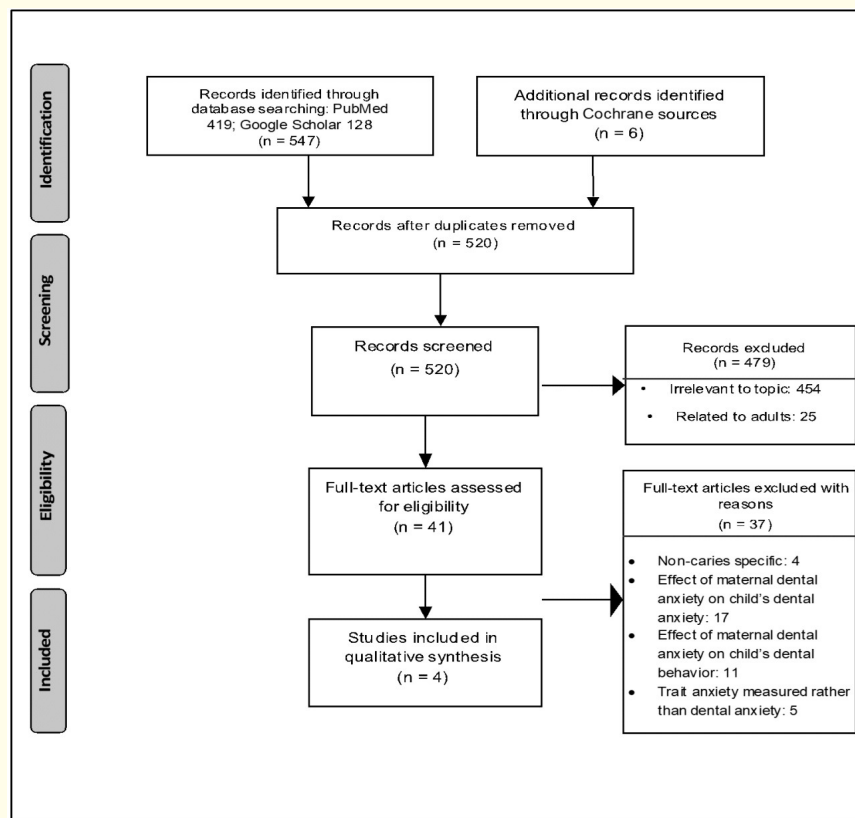


Figure 1: PRISMA (Preferred reporting items for systematic reviews and meta-analyses) flow diagram.

**Study characteristics: study design and population**

The main characteristics of included studies are shown in table 1. All included studies were cross-sectional and published between 1989 and 2018, with 3 studies published in the 2010s. The studies originated from Finland [23], Brazil [22] and India [20,21]. The total number of participants in all studies included in the systematic review was 1151 parent and child pairs. The age range of the children varied from 2 years to 14 years old. The gender distribution of children was only mentioned by two of the four studies. Three of the studies had only mother and child pairs as participants [20-22] whereas one of the studies had either the child’s father or mother as a participating parent [23].

Author (country)	Year	Journal	Study Design	Participants	Parental Dental Anxiety	Caries Status of Child	Outcome measures	Results
Lahti S., et al. [23] (Finland)	1989	<i>ASDC Journal of Dentistry for Children</i>	Cross-sectional	<ul style="list-style-type: none"> <li>129 parent (either father or mother) parent and child pairs</li> <li>Child’s age range: (11-12 years)</li> <li>Child’s gender: Not specified</li> </ul>	Corah’s Dental Anxiety Scale (DAS)	DMFT/dmft	Association between dental anxiety, socio-economic status, caries status and oral health habits of parents and their children	There was a significant relationship between child’s caries and parental dental anxiety
Goettens ML., et al. [22] (Brazil)	2011	<i>Caries Research</i>	Cross-sectional	<ul style="list-style-type: none"> <li>608 mother and child pairs</li> <li>Child’s age range: (2-5 years)</li> <li>Child’s gender: (49.5% male, 50.5% female)</li> </ul>	Corah’s Dental Anxiety Scale (DAS)	dmft	Association between maternal dental anxiety and related behaviors and caries experience of the child	There was a strong association between child’s untreated dental caries and parental dental anxiety at any level
Khawja SG., et al. [21] (India)	2015	<i>Journal of Clinical and Diagnostic Research</i>	Cross-sectional	<ul style="list-style-type: none"> <li>187 mother and child pairs</li> <li>Child’s age range: (3-14 years)</li> <li>Child’s gender: Not specified</li> </ul>	Corah’s Modified Dental Anxiety Scale (MDAS)	DMFT/dmft DMFS/dmfs	Association between maternal dental anxiety and caries experience in children	There was a significant positive relationship between child’s caries and parental dental anxiety
Balasubramanian., et al. [20] (India)	2018	<i>Journal of Orofacial Sciences</i>	Cross-sectional	<ul style="list-style-type: none"> <li>227 mother and child pairs</li> <li>Child’s age range: (3-6 years)</li> <li>Child’s gender: (44.9% male, 55.1% female)</li> </ul>	Corah’s Dental Anxiety Scale (DAS)	dmft	Association between maternal and child dental anxiety on caries experience and dental attendance pattern of the child	There was a significant relationship between the “mt” and “ft” components of the dmft index and parental dental anxiety

**Table 1:** Characteristics of included studies.

### Exposure types

Parental dental anxiety was measured using either Corah's dental anxiety scale (DAS) [20-23] or Corah's modified dental anxiety scale (MDAS) [21] in all the included studies. DAS is a self-report measure of dental anxiety [24] and consists of four questions related to various aspects of dental treatment and measures dental fear on a scale from 4 (none) to 20 (extremely high). DAS is the most widely used instrument to assess dental anxiety as it has satisfactory reliability and validity [25]. The five-item MDAS has been developed by the modification of DAS [26]. The MDAS questionnaire asks questions starting from the feeling of having an appointment with the dentist to having a tooth being drilled and lastly having a local anesthetic injection being injected into the gums. This scale has a score range of 5 to 25, with each item's response ranging from 1 (not anxious) to 5 (extremely anxious). Parental dental anxiety in the studies were classified as low, moderate or high.

### Outcome measures

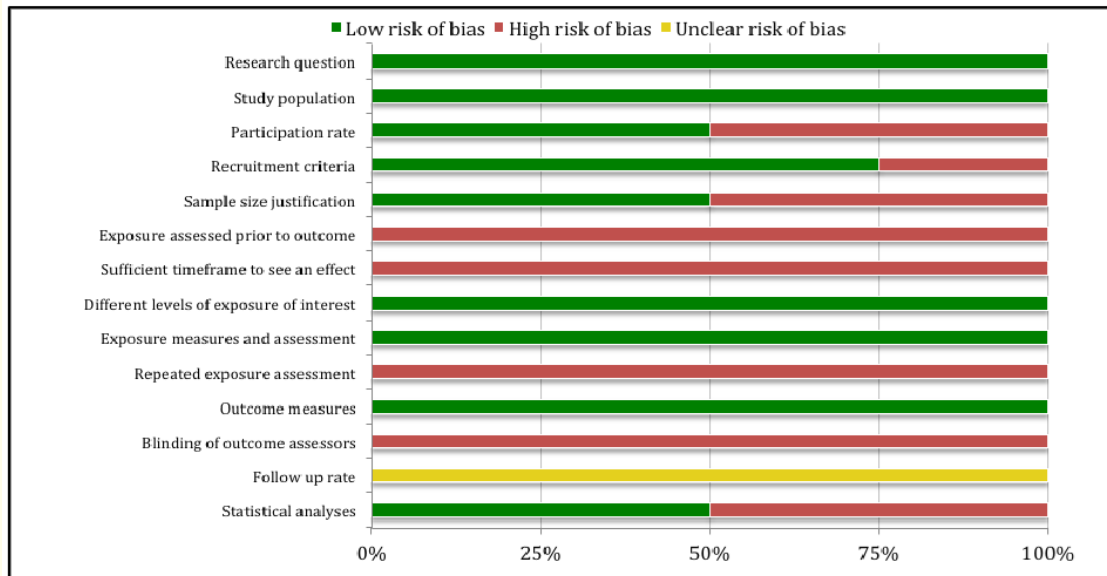
Regarding the main outcome tested, all studies examined the association between parental dental anxiety and caries experience of the child. All studies evaluated dental caries using the decayed, filled, and missing teeth (DMFT/dmft) index or decayed, filled and missing surfaces (DMFS/dmfs) index, according to the World Health Organization. Moreover, Lahti, *et al.* investigated the inter-correlations of socioeconomic status, caries status and oral health habits of the parents and the caries experience of the child [23]. Balasubramanian, *et al.* looked at the association between maternal and child's dental anxiety and the dental attendance pattern of the child as well [20].

### Results of individual studies

All four studies found an association between parental dental anxiety and the caries experience of the child (Table 1). The study by Lahti, *et al.* found that the df of the children was negatively correlated with the dental anxiety of the father whereas no significant relationship was found between the dental anxiety of the mother and the df of the children [23]. The results of their multiple regression analyses support a positive relationship between the dental anxiety of fathers and the caries experience of the children [23]. Balasubramanian, *et al.* concluded that maternal dental anxiety is associated with higher number of missing teeth due to dental caries and lesser number of restored teeth in their children [20]. Furthermore, Khawja, *et al.* found a significant positive relationship between maternal dental anxiety and the child's caries status, specifically the number of decayed teeth [21]. Finally, the study done by Goettems, *et al.* showed that maternal dental anxiety at any level was strongly associated to untreated dental caries in children, even after confounder adjustment [22].

### Risk of bias within studies

The NIH Quality Assessment Tool for Observational Cohort and Cross-Sectional Studies were used to determine the risk of bias within the included studies. Overall, two studies were assessed as good with low risk of bias [20,22] and two as fair with moderate risk of bias [21,23]. The percentages of compliance for each item of the quality assessment tool across all included studies are presented in figure 2. Since all of the included studies were cross-sectional, three criteria of the assessment tool, namely exposure assessed prior to outcome measurement, sufficient timeframe to see an effect, and blinding of outcome assessors were answered with a "no" indicating high risk of bias. One criterion, follow-up rate, was answered as "non-applicable," indicating unclear risk of bias. In terms of other criteria, all of the studies presented the research question and the study population, most of them presented the recruitment criteria, and all of them reported different levels of exposure, exposure measures, and outcome measures decreasing the risk of bias. The criteria that increased the risk of bias of the included studies were sample's size justification, lack of presentation of the participation rate, repeated exposure assessment, and statistical analyses used.



**Figure 2:** Risk of bias within studies. Percentages of compliance for each item of the NIH quality assessment tool across all included studies. The criteria answered with a “no” are presented with red indicating high risk of bias. The criteria answered as “non-applicable,” are presented with yellow indicating unclear risk of bias.

**Discussion**

To the best of our knowledge, this study is the first systematic review examining a possible association between parental dental anxiety and the caries status of a child. The objective of a systematic review is to identify, evaluate, and synthesize evidence from previously conducted studies to provide informative empirical answers to unanswered research questions. The key question of the present review is: what type of influence does parental dental anxiety have on the caries experience of the child?

The results of the included studies were consistent and suggest that parental dental anxiety is positively associated with the caries status of the child. Children of parents with high dental anxiety experienced a higher number of decayed and missing teeth and a lower number of restored teeth compared to children of parents with low dental anxiety. However, these findings should be interpreted with caution due to the risk of bias of cross-sectional studies. The temporal relationship of cause and effect cannot be established due to the cross-sectional nature of the studies.

One of the limitations of the present systematic review is that all the included studies were cross-sectional in design which are considered of lower quality as they present higher risk of bias and lower the quality of evidence. The NIH Quality Assessment Tool for Observational Cohort and Cross-Sectional Studies was used to assess the risk of bias of the individual studies, and although this is an accredited tool to assess risk of bias of cross-sectional studies, this design by default has an increased risk of bias [27].

Another limitation is the fact that dental caries experience of the children may have been influenced by other factors such as parental knowledge and beliefs regarding dental caries, socioeconomic status and access to dental care [28,29]. Furthermore, the studies varied in regard to the sample’s age, culture and other aspects that could be considered confounding factors. To better understand the effects of

parental dental anxiety on caries status of the child and for better generalizability, more population-based studies should be conducted, taking into account other factors that can potentially influence the dental caries experience of the child.

Previous studies have shown a link between parental dental anxiety and dental behavior management problems as well as dental treatment avoidance [30-32], both of which could prevent children from receiving appropriate dental care. Another study in preschoolers has concluded that parental dental anxiety might be correlated with the children's oral condition through their mothers' attitudes toward their children's oral healthcare [33]. Therefore, it is pivotal that measures are taken to reduce dental anxiety among parents as a whole. Proper dental health education, effective communication with either parent, good patient-dentist relationship, and regular dental visits could help in reducing their dental anxiety. These measures will not only improve oral healthcare of the mothers but in turn will translate into better utilization of preventive and restorative dental services for their children.

### Conclusion

Based on this systematic review's results, the following conclusions can be made:

1. The results of the included studies from the current literature were consistent.
2. There was a significant relationship between parental dental anxiety and caries experience of the child.
3. However, this finding should be interpreted with caution, as all of the included studies were cross-sectional and some studies presented moderate quality of evidence.

### Bibliography

1. Bagramian RA., *et al.* "The global increase in dental caries. A pending public health crisis". *American Journal of Dentistry* 22.1 (2009): 3-8.
2. Petersen PE., *et al.* "The global burden of oral diseases and risks to oral health". *Bulletin of the World Health Organization* 83.9 (2005): 661-669.
3. Palmer CA., *et al.* "Diet and caries-associated bacteria in severe early childhood caries". *Journal of Dental Research* 89.11 (2010): 1224-1229.
4. Touger-Decker R and Van Loveren C. "Sugars and dental caries". *The American Journal of Clinical Nutrition* 78.4 (2003): 881S-892S.
5. Gillcrist JA., *et al.* "Community socioeconomic status and children's dental health". *Journal of the American Dental Association* 132.2 (2001): 216-222.
6. Colak H., *et al.* "Early childhood caries update: A review of causes, diagnoses, and treatments". *Journal of Natural Science, Biology, and Medicine* 4.1 (2013): 29-38.
7. Hatipoğlu Z and Akşit-Bıçak D. "Maternal anxiety, social status, and dental caries formation in children: a cross-sectional study". *The Journal of International Medical Research* 47.12 (2019): 6206-6214.
8. Adair PM., *et al.* "Familial and cultural perceptions and beliefs of oral hygiene and dietary practices among ethnically and socio-economically diverse groups". *Community Dental Health* 21.1 (2004): 102-111.
9. Skeie MS., *et al.* "Caries increment in children aged 3-5 years in relation to parents' dental attitudes: Oslo, Norway 2002 to 2004". *Community Dentistry and Oral Epidemiology* 36.5 (2008): 441-450.

10. Vanagas G., *et al.* "Associations between parental skills and their attitudes toward importance to develop good oral hygiene skills in their children". *Medicina* 45.9 (2009): 718-723.
11. Beck AT., *et al.* "Anxiety disorders and phobias: A cognitive perspective". Basic Books (2005).
12. Agras S., *et al.* "The epidemiology of common fears and phobia". *Comprehensive Psychiatry* 10.2 (1969): 151-156.
13. Themessl-Huber M., *et al.* "Empirical evidence of the relationship between parental and child dental fear: a structured review and meta-analysis". *International Journal of Paediatric Dentistry* 20.2 (2010): 83-101.
14. Tickle M., *et al.* "A prospective study of dental anxiety in a cohort of children followed from 5 to 9 years of age". *International Journal of Paediatric Dentistry* 19.4 (2009): 225-232.
15. Olak J., *et al.* "Children's dental fear in relation to dental health and parental dental fear". *Stomatologija* 15.1 (2013): 26-31.
16. Kinirons M and McCabe M. "Familial and maternal factors affecting the dental health and dental attendance of preschool children". *Community Dental Health* 12.4 (1995): 226-229.
17. Goettems ML., *et al.* "Influence of maternal characteristics and caregiving behaviours on children's caries experience: An intergenerational approach". *Community dentistry and Oral Epidemiology* 46.5 (2018): 435-441.
18. Liberati A., *et al.* "The PRISMA statement for reporting systematic reviews and meta-analyses of studies that evaluate health care interventions: explanation and elaboration". *PLoS Medicine* 6.7 (2009): e1000100.
19. National Institutes of Health. Study Quality Assessment Tools (2020).
20. Balasubramanian S., *et al.* "Association of Maternal and Child Dental Anxiety With Dental Caries Experience and Dental Attendance Pattern of the Child". *Journal of Orofacial Sciences* 10.2 (2018): 75.
21. Khawja SG., *et al.* "Maternal Dental Anxiety and its Effect on Caries Experience Among Children in Udaipur, India". *Journal of Clinical and Diagnostic Research: JCDR* 9.6 (2015): ZC42-ZC45.
22. Goettems ML., *et al.* "Influence of maternal dental anxiety on the child's dental caries experience". *Caries Research* 46.1 (2012): 3-8.
23. Lahti S., *et al.* "The relationship of parental dental anxiety and child's caries status". *ASDC Journal of Dentistry for Children* 56.3 (1989): 191-195.
24. Corah NL. "Development of a dental anxiety scale". *Journal of Dental Research* 48.4 (1969): 596.
25. Newton JT and Buck DJ. "Anxiety and pain measures in dentistry: a guide to their quality and application". *Journal of the American Dental Association* 131.10 (2000): 1449-1457.
26. Newton JT and Edwards JC. "Psychometric properties of the modified dental anxiety scale: an independent replication". *Community Dental Health* 22.1 (2005): 40-42.
27. Von Elm E., *et al.* "The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) Statement: guidelines for reporting observational studies". *International Journal of Surgery* 12.12 (2014): 1495-1499.
28. Hooley M., *et al.* "Parental influence and the development of dental caries in children aged 0-6 years: a systematic review of the literature". *Journal of Dentistry* 40.11 (2012): 873-885.
29. Amin M and Perez A. "Is the wait-for-patient-to-come approach suitable for African newcomers to Alberta, Canada?" *Community Dentistry and Oral Epidemiology* 40.6 (2012): 523-531.



30. Eitner S., *et al.* "Dental anxiety--an epidemiological study on its clinical correlation and effects on oral health". *Journal of Oral Rehabilitation* 33.8 (2006): 588-593.
31. Lee CY., *et al.* "The clinically related predictors of dental fear in Taiwanese children". *International Journal of Paediatric Dentistry* 18.6 (2008): 415-422.
32. Wigen TI., *et al.* "Dental avoidance behaviour in parent and child as risk indicators for caries in 5-year-old children". *International Journal of Paediatric Dentistry* 19.6 (2009): 431-437.
33. Tuutti H and Lahti S. "Oral health status of children in relation to the dental anxiety of their parents". *The Journal of Pedodontics* 11.2 (1987): 146-150.

**Volume 19 Issue 9 September 2020**

**All rights reserved by Heidar Zohrehei., *et al.***