Evaluating the Relationship between Parental Dental Anxiety and Early Childhood Caries

*Forough Amirabadi[1], Yeganeh Saffary[2]

[1]Assistant Professor, Oral and Dental Disease Research Center, Department of Pediatric Dentistry, School of Dentistry, Zahedan University of Medical Sciences, Zahedan, Iran.

[2]Dentist, Zahedan University of Medical Sciences, Zahedan, Iran.

Abstract

Background
Early Childhood Caries (ECC) is considered as the most prevalent childhood disease. Numerous factors have been mentioned for the formation of ECC. This study evaluated the relationship of parental dental anxiety and ECC in Iranian Children.

Materials and Methods
In this cross-sectional study, 340 parent-child dyads were divided into two groups: the first group consisted of 170 parents and their 3-6-year-old child with ECC (the case group), and the second group consisted of 170 parents and their 3-6-year-old child without ECC (the control group). Samples were selected using cluster random sampling from the kindergartens of Zahedan, Iran in 2019. A questionnaire containing parent's information (age, education level, occupation and monthly income), and Corah Dental Anxiety Scale (CDAS) were used in this study. Data were analyzed using SPSS software version 20.

Results
The anxiety level of mothers and fathers of the case group was similar to the control group (P= 0.284 and P= 0.114, respectively). There was no statistically significant difference between the level of parental anxiety (mother and father), and dmft index in the case group (P= 0.154 and P= 0.255, respectively). Also, mothers who were equal or less than 30 years-old were more anxious than mothers with more than 30 years-old (P= 0.034).

Conclusion
Based on the results, there were no significant differences in the groups based on parental dental anxiety. In other words, parental dental anxiety cannot lead to ECC in children.

Key Words: Dental Anxiety, Early Childhood Caries, Parents.

**Corresponding Author:*

Forough Amirabadi, Oral and Dental Disease Research Center, Department of Pediatric Dentistry, School of Dentistry, Zahedan University of Medical Sciences, Zahedan, Iran.

Email: dr_amirabadif@yahoo.com

1- INTRODUCTION

Early childhood caries (ECC) is defined as "the presence of one or more decayed (non-cavitated or cavitated), missing (because of caries), or filled tooth surfaces in any primary tooth in a child at 71 months of age or younger"(1). Repeated feeding and nightly feeding from nursing bottle, repeated consumption of snacks or drinks containing sugar between the meals, etc., are considered as numerous factors, which cause ECC (1). Oral hygiene, fluoride of drinking water, transmission of microbes causing caries from the mother to the child, hypoplasia and other defects of tooth structure, amount of saliva, ability to neutralize the acid PH and the life style are the other effective factors on the occurrence and intensity of ECC (2).

Parents, especially mothers, play an important role in stabilizing oral health promoting behaviors that prevent the development of dental caries in children. In preschool children, parents are the main care providers for their baby's oral health. In the preschool period (3-6 years), the child's progress in oral health begins, but parents are still the main supplier of dental and oral health (3, 4). Stress and stress provoking factors have emerged as important variables in studies about health and disease in the recent decades. General stresses affect general and oral health.

Parental stress, stress of family environment, job, and other aspects of stress are inordinately complex and interdependent (2, 5). Stress in parents affects their behavior; therefore, it has negative effects on their children. The effect of parental stress is widespread and varied. Parental stress is associated with more depressive symptoms, disease and a higher rate of using medical services or vice versa, ignoring and neglecting health status. Parental stress affects marital relationships, and would lead to reducing marital adjustment, and child training (6). Thus, it is surprising that psychological studies have not widely investigated the relationship between the parental stress and ECC. According to the prevalent effects of parental stress, it is necessary dentists and researchers (7, 8) investigate the dynamic pattern and epidemic of stress on the parental role. Anxiety has a common neurobehavioral relationship with a variety of stressors and exposure to acute and chronic stress can accelerate anxiety disorders (9). Dental anxiety affects a significant a significant portion of the population of people of all ages from different social classes (10). General evidence suggests that anxious parents interact differently with their children compared to non-anxious parents (11).

There are studies, which recommend direct effect of parental stress and anxiety on child caries (8, 12-14). However, there are some studies, which have shown there is no relationship between the parental stress and anxiety and ECC formation (6, 15). Despite limited evidence from very few studies, the association between parental dental anxiety and caries is unclear. Since many unknown causes can be responsible for ECC, understanding these factors can lead to control and prevention of ECC. Therefore, this study aimed to investigate the relationship between parental dental anxiety and the formation of ECC.

2- MATERIALS AND METHODS

2-1. Study design and population

This cross-sectional descriptive analytical study was done on 340 children (based on sample size formula, with $\alpha = 0.05$, 80% power and 10% error rate) in two groups by cluster random sampling in January 2019. The first group consisted of 170 parents and their 3-6-year-old child with ECC (the case group), and the second group consisted of 170 parents and their 3-6-year-old child without ECC (the control group). Children were matched for age and gender in the both groups. It was conducted in 14 kindergartens in and

around Zahedan, Iran for a period of 2 months (January- February 2019), and the sampling method followed was cluster random sampling.

2-2. Inclusion criteria

The inclusion criteria of this study were children from 3 to 6 years old with general, physical and mental health; parents who were healthy psychologically (parents without any history of going to a psychiatrist and taking any psychiatric medications); parents (both father and mother), and children were willing to cooperate. Both parents should have minimum literacy skills.

2-3. Methods

In this study, parents were divided into three groups based on their education (without diploma, with diploma and with university degrees), and they were divided into two groups based on their age (≤ 30 and > 30). Parents were also examined for economic status. The economic situation was divided into three groups, based on the monthly income of the family: weak (monthly income$\leq$ 40.000.000 Rials), average (monthly income= 40-100,000,000 Rials) and good (monthly income>100,000,000 Rials). Total parent income was considered as family income.

Each child was clinically examined by a trained dental intern on the chair, with the head light, dental disposable mirror and explorer without drying according to the World Health Organization criteria (WHO, 1997). After two weeks, the intra-examiner reliability was calculated by re-testing 10% of the sample volume. The intra-examiner reliability was good (kappa coefficient=0.9). A questionnaire including parental information questions such as age, education, occupation and monthly income and the Corah Dental Anxiety Scale (CDAS) was sent to both parents through kindergarten teacher. The questionnaires were completed by the parents at home on a self-administered basis. Each parent was

identified with a code and their names were not disclosed. Completing the questionnaires took approximately 10 minutes. Corah Dental Anxiety Scale (CDAS) was used in order to determine parents' dental anxiety. This scale is the most commonly used index of dental anxiety to identify and distinguish the individuals with anxiety in dentistry. Corah invented this simple and reliable appliance (16), for the first time in 1969 (17). This index consists of 4 questions with 5 choices. Each of the choices has its own grade, so that the A choice has the grade of one and the E choice has the grade of 5. The sum of the grades can be between the numbers 4 and 20. The numbers between 4 and 8 represent low anxiety, 9-14 represent moderate anxiety and 15-20 represent high anxiety (17). The validity and reliability of the questionnaire have been confirmed in previous study (18).

2-4. Ethical consideration

The ethics committee of Zahedan University of Medical Sciences with the code of IR.ZAUMS.REC.1398 approved present study. The parents signed full parental consent forms, too.

2-5. Data Analysis

Statistical analysis was performed using SPSS 20 software (Microsoft, IL, USA). The Mann-Whitney U test was used to compare dental anxiety in both case and control groups. Comparison of anxiety and dmft based on parental education and family status with Kruskal-Wallis test and anxiety comparisons were carried out based on age group with Mann-Whitney U test. The level of significance was determined at P$\leq$0.05.

3-RESULTS

In this study, 170 parents and their 3-6-year-old child with ECC (the case group), and 170 parents and their 3-6-year-old child without ECC (the control group)

were investigated. The mean dmft in the case group was 5.21 ± 2.29. The mean anxiety of mothers and fathers in the case group was 9.64 ± 4.33 and 7.18 ± 3.39, respectively. The mean anxiety of mothers and fathers in the control group was 9.37 ± 4.51 and 7.82 ± 3.83, respectively. There was no statistical difference between the mothers and father's anxiety in the case group with the mothers and father's anxiety in the control group (P=0.284 and P= 0.114, respectively). **Table.1** shows dental anxiety levels in the case and control group. There was no statistically significant difference between the level of parental anxiety (mother and father), and dmft in the case group (P=0.154 and P= 0.255, respectively). **Table.2** shows sociodemographic characteristics of the parents (mother, father) of the two groups in terms of education, age, and economic status.

Table-1: Dental anxiety levels in the case &control groups.

Anxiety levels	Case group				Control group	
	Mother's anxiety	Child's dmft based on mother's anxiety	Father's anxiety	Child's dmft based on father's anxiety	Mother's anxiety	Father's anxiety
Low	67 (39.4%)	4.90± 2.94	108 (63.5%)	5.19±3.00	74 (43.5%)	94 (55.3%)
Medium	70 (41.2%)	5.06± 2.63	57 (33.5%)	5.41 ±2.82	57 (33.5%)	58 (34.1%)
High	33 (19.4%)	6.24± 3.35	5 (2.9%)	3.25±1.89	39 (22.9%)	18 (10.6%)
P- value*	0.154		0.255		------	------

*: Mann Whitney U test.

Table-2: Sociodemographic characteristics of parents of two groups in terms of education, age and economic status.

Variables	Sub-group	Mother		Father	
		Case	Control	Case	Control
Education	Without Diploma	14 (8.23%)	3 (1.76%)	10 (5.88%)	1 (.58%)
	Diploma	38 (22.35%)	9 (5.29%)	36 (21.17%)	19 (11.17%)
	University	118 (69.41%)	156 (91.76%)	124 (72.94%)	141 (82.94%)
Age	≤30	10 (5.88%)	13 (7.64%)	6 (3.5%)	4 (2.35%)
	>30	160 (94.11%)	157 (92.35%)	164 (96.47%)	155 (91.17%)
Economic status	Level	Case group		Control group	
	Weak	7 (4.11%)		4 (2.35%)	
	Average	106 (62.35%)		118 (69.41%)	
	Good	57 (33.52%)		48 (28.23%)	

The next purpose was to compare the dental anxiety in the parents of the case group based on age, gender, level of education and economic level (**Table.3**). In the case group, the anxiety of mothers varied according to the level of education and age (P< 0.05). Because mothers with diploma education had significantly more anxiety compared to mothers without diploma and university degrees (P= 0.037). In addition, 30-year-old mothers or younger were more anxious than mothers over the age of 30 (P= 0.034). However, according to the economic situation, the level of anxiety of mothers was similar. In the case group, fathers' anxiety varied according to the economic status (P< 0.05). So that fathers with a weak economic situation had significantly more anxiety than others (P= 0.048). However, the anxiety of fathers was similar in terms of education and age. According to **Table.3**, there was no relationship between age, economic status of parents and father's education with dmft mean in children (P>0.05). But there was a significant relationship between maternal education and caries in children, so children with mothers without diploma education showed higher dmft mean (P=0.041). In comparison, the dental anxiety in the parents of the control group was similar as regards age, gender, level of education and economic level (P> 0.05). Also, there was no statistical difference between parents' dental anxiety in the two groups based on age, gender, education and economic level (P> 0.05).

Table-3: Comparison of the mean of dental anxiety of parents in case group based on age, educational level, economic level.

Variables	Sub-group	Mother's Anxiety		Child's dmft based on mother's anxiety	Father's Anxiety		Child's dmft based on father's anxiety
		Mean	Standard Deviation		Mean	Standard Deviation	
Education	Without Diploma	8.285	4.1918	7±4.24	7.428	4.8941	5.2±1.92
	Diploma	11.318	4.4974	5.36±3.05	8.032	8.8339	5.03±3.17
	University	8.931	3.9864	4.65±2.30	7.121	3.2814	5.2±2.94
	*P- value	0.037		0.041	0.441		0.939
Age	≤30	12.000	3.7712	5.44±3.55	6.3333	2.5166	6.2±3.19
	>30	9.092	4.1866	5.01±2.91	7.352	3.5031	5.18±2.9
	**P value	0.034		0.813	0.618		0.447
Economic Status	Weak	7.666	3.5023	4.6±1.67	8.428	4.0355	4.6±1.67
	Average	9.188	4.2301	5.01±2.7	7.311	3.5652	5.01±2.7
	Good	9.600	4.2626	5.7±3.4	7.208	3.2873	5.7±3.4
	*P-value	0.539		0.355	0.048		0.355

*Kruskal-Wallis test, **: Mann Whitney U test.

4- DISCUSSION

The present study assessed the influence between parental dental anxiety and ECC among 3–6-year-old children. Children make up a significant percentage of the world's population and providing and promoting their health are considered as one of the first health priorities in the societies (19). Tooth decay is the most common infectious disease and the most common health requirement among American children (1). Dental caries with side effects such as food impaction, pain and dental abscess can disrupt children's nutrition and change their diet (20, 21). Some studies have been recently done

about the effect of parents' anxiety on ECC (4-8, 12-14, 22-25), and the present study has addressed this issue. In the present study, the anxiety level of mothers and fathers of the case group (with ECC) was similar to the control group (caries free). In studies by Jabbarifar et al. and Tang et al., there was no relationship between the overall stress of the parents and the ECC (6, 22). In these two studies, the researchers had used the Parental Stress Inventory (PSI-LF) to measure the overall stress of the parents.

In our study, the parents' dental anxiety was considered but since the anxiety is often associated with stress (26) the results of these studies were considered equal with the present study. Tang et al. stated that more longitudinal studies are necessary to determine the relationship between caries and stress of parents. However, the maternal Parenting Stress Index (PSI) scores showed a significant effect on childhood disorders, paying attention to deficits of the child, life stress, and relationship with spouses between ECC and caries free groups (22).

In this regard, Murali et al. found that maternal age, child's age, income, lack of information on the oral health related quality of life, the presence of caries and pain in the child, are significantly associated with the child's dental visits. However, there was no significant relationship between maternal dental anxiety and dental care visits of the child (15). In a study by Pani et al., it was also observed that mothers with children with ECC had more salivary levels of cortisol than mothers with children without caries, but these researchers stated that salivary levels of child's cortisol affect the level of incidence of ECC directly, but it seems that maternal stress has an indirect effect on the incidence of ECC (23). In line with this finding, Jafarzadeh et al. showed that there is a relationship between the level of maternal depression and the level of

children's dmft only at high levels of depression, and this result was not observed at the low to moderate levels of depression (24). The results of the above studies are consistent with the results of this study. However, there is a significant relationship between parents' anxiety and early childhood caries based on some studies, contrary to the present study. According to Finlayson et al., the parents with lower stress scores had children with higher ECC (7). Khawja et al. found that mothers with lower education and lower income had higher levels of anxiety (13).

This result is in agreement with the present study but the mean score of dental caries in children with highly anxious and phobic mothers was also obviously higher than mothers with mild anxiety unlike the present study (13). Balasubramanian et al. stated that both maternal dental anxiety and child dental anxiety can affect the childhood caries experience (12). Ain et al. stated that the incidence of dental caries in children with very anxious mothers is much more and according to the results of this study, there is a relationship between the dental anxiety of mothers and the prevalence of caries in children (8). According to Santos et al., children with depressed mothers had higher prevalence of caries. They stated that maternal psychiatric disorders can have detrimental effects on children's oral health (25).

Menon et al. said that parental stress scores were increased by increasing decayed teeth and children with the highest decayed teeth had the highest score of parental stress index (14). The results of these studies are contrary to the present study. Using the different measurement methods and instruments for evaluating the mental status of families is considered as one of the reasons for the differences in the results of the studies. The size of samples (generally small) which are investigated and their being cross sectional are other reasons. Removal of conflicting variables

(preterm birth of children, genetic and environmental factors) in the studies is another factor, which influences the results of studies. In our study, the anxiety of mothers and fathers was similar in control groups in terms of their education, age and economic status in the present study. However, in the case group, the anxiety of mothers with lower education (diploma) was higher than mothers with university education. Comparison of ECC in children of these mothers also showed that the ECC of children with diploma mothers (5.36 ± 3.05) was significantly higher than ECC of children with mothers who had academic education (4.65 ± 2.30). In the study of Qandehari et al., children's dmft was significantly decreased by increasing the parental education and it reached from 4.5 for children with parents with primary education to 1.73 for children with parents with postgraduate education and higher (27). In the study of Nematollahi et al. in Mashhad, the prevalence of caries was also increased with maternal education level (20). In the present study also, the anxiety of the case group mothers with university education was lower than mothers with diploma education, and the ECC of children who had mothers with academic education was lower than mothers with diploma. Olmes and Uzamaris examined the factors, which affect the incidence of ECC in 9–59 month-old children, and found that the lower level of father's education was associated with a high incidence of ECC (28). In the present study, the anxiety of younger age mothers was significantly higher in the case group. The ECC of children in mothers with equal and less than 30 years (5.44 ± 3.35) was slightly higher than mothers who are older than 30 years (5.01 ± 2.91) based on caries examinations, but there was no significant difference. In the present study, the anxiety of mothers was similar in terms of economic status. However, the anxiety of fathers with low economic status was significantly higher than others.

Nevertheless, the ECC level of children did not differ significantly according to the family's economic status. Also, fathers' anxiety was also similar in terms of education and age. In Rajab and Hamdan's study (2002), on 1-5 year-old children in Jordan, nutritional methods, oral hygiene status, dentist referral frequency, parental social economic status, education level and parent's awareness were known as factors, which affect caries (29). Rai and Tiwari (2018) in their systematic study stated that ten research studies confirmed the relationship between maternal education and ECC in children. In addition, the economic situation was significantly related to ECC in 13 studies in terms of family's annual income and the relevant occupational level (30). Higher income and education were directly related to ECC according to a study by Finlayson et al. (7). In a study by Sanders et al., younger parents were less educated and most of them were affected by economic factors, tooth decay was more common in their children (31). The results of these studies (29-31) are consistent with the present study. Given that variables such as economic, social, cultural status, access to health services, access to fluoridated water and nutritional conditions can affect children's health, including the overall health of the body, their mental and oral health, therefore, there is a necessity to manage more basic factors of the community health, along with appropriately training health and culture-making methods. Teaching parents should be in line with the individual needs of the child and parents and it is based on their culture. In this training, listening to parents, educating them, getting their consent can make the prevention program a success. Evaluation of anxiety in both parents is considered as one of the strengths of our study, whereas in most studies only mother or one parent was evaluated. But, the limitation of this study was the cross sectional nature of it.

Longitudinal and controlled studies are needed to understand the causal relationship between family psychological factors and children's oral health. It should also be kept in mind that our study population is not fully covered by all Iranian parents and children and the results cannot be generalized to other parents and children of different cultures. It is recommended that more studies should be conducted as longitudinal studies with a larger sample size. Also, the study should be separately conducted in boys and girls, as well as in employed mothers and housewives.

5- CONCLUSION

The anxiety level of mothers and fathers of the case group was similar to the control group. There was no statistically significant difference between the level of parental anxiety, and dmft index in the case group. In the case group, the anxiety of mothers with diploma was more than other degrees. In addition, mothers who were 30 years old or less were more anxious than mothers over 30 years old. Fathers with weak economic situation had significantly more anxiety than others. In the control group, the anxiety of mothers and fathers was similar based on educational level, age and economic status. According to the results of this study, there were no significant differences in the groups based on parental dental anxiety. In other words, parental dental anxiety cannot lead to ECC in children.

6- CONFLICT OF INTEREST: None.

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