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Dental Anxiety in Children in Relation to Dental Health

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ABSTRACT

The aim of the present study was to assess the influence of dental anxiety on children's dental status, and to determine degree of association between mother's anxiety and child's dental anxiety. The study was performed in a sample of 138 pairs of mothers and their children aged 11-12 years. Corah's Dental Anxiety Scale (CDAS) was used to assess degree of anxiety in children and their mothers. DMFT scores, as a measure of dental health, were collected for all children under study. Spearman's rank correlation coefficients (r) were computed to compare degree of association between analysed parameters. The patients were classified in the following groups: 1. low dental anxiety (CDAS = 4-8; N=53), 2. moderate dental anxiety (CDAS = 9-12; N = 45), and 3. high dental anxiety (CDAS = 13-20; N = 40). All children were divided into four groups on the basis of DMFT: caries-free children: DMFT = 0; low caries intensity: DMFT = 1-2; moderate caries intensity: DMFT = 3-4; and high caries intensity: DMFT = 5-10. Children's CDAS score showed significant correlation with DMFT score (r=.3198; P<0.001) and mother's CDAS (r=.3886; P<0.001). Children with high caries intensity displayed significantly higher mean CDAS score (11.81) than caries free children (7.77) (t = 3.63; P < 0.001). The results showed that dental anxiety in children is related to their mother's dental anxiety (r = 0.388, P < 0.001). Highly anxious children display significantly higher DMFT score than children with low anxiety (t = 3.69, P < 0.001). The results show significant association between child's dental anxiety and dental health. Children with high dental anxiety display significantly higher caries intensity. Mother's dental anxiety shows significant association with child's dental anxiety, but not with child's dental health.

Key words: *children, dental anxiety, dental health*

Introduction

Numerous studies on dental anxiety in children have revealed that dental fear can lead to the avoidance of dental care, deterioration of dental health and persistence of dental anxiety in the adulthood[1–5]. The child's dental anxiety and fear of dental treatment have been recognised in many countries as a real public health problem[6–8].

The aetiology of dental anxiety is multifactorial with many factors contributing to its appearance. Child's dental anxiety has been related to previous painful and unpleasant medical and dental experiences, temperament and emotional status, genetics, socio-economic status of the family, parental dental fear, age, gender and different psychosocial factors[9–16]. Between the most important factors are previous negative medical and dental experiences. The importance of these factors as a part of complex aetiology of child's dental anxiety still has to be elucidated.

Influences of social environment are also very important for the development and level of dental anxiety. Child parents' and peer's comments about dental treatment have strong influence on fear of dental treatment[17, 18]. Some studies have demonstrated a close relationship between mother and child dental anxiety[17–19]. It was established that maternal anxiety before children's dental treatment is significantly associated with children's dental fear[20].

The strongest effects have child's direct painful and unpleasant experiences during dental treatment. Previous unpleasant medical experiences have a similar effect on the appearance of child's DA. A relationship between child dental fear and general fear were the object of investigations in numerous studies, but still there is a lack of information about the relationship between dental fear and fear of medical procedures.

Klingberg et al.[5] have shown that child dental fear is significantly associated with dental caries. They also es-

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tablished that maternal dental fear and general fear are important etiologic factors in the development of dental fear in children. Corkey and Freeman[21] have found maternal dental anxiety to be closely related to child dental anxiety status. Previous studies differ in their results regarding the association of child dental fear and dental health status assessed by DMFT score. In some studies the relation of child dental anxiety and DMFT scores was found[6,16,22–26], while other studies failed to establish such association[8,26–29].

More recently Klingberg et al.[5] established significant relationship between child dental fear and child dental health. Children with high dental fear had more carious teeth. Different findings in that aspect are attributed to the differences in the ages of the study groups, different measurements of dental health, and cultural differences in performing dental care[5].

The objective of the present study was to analyse the relationship between child dental anxiety and child dental health. The aim was also to assess the relationship between maternal and child dental anxiety.

Subjects and Methods

Sample

The study sample comprised 138 pairs of children and their mothers. All children (67 girls and 71 boys) were from primary schools in Zagreb, Croatia, aged 10 – 11 years. Children were randomly selected for the study and all were of good general health. The parents of the children were informed on the nature of the study to obtain their consent. The children and their mothers were invited to dental office for the dental examination and dental anxiety assessment.

Survey instruments and procedures

1. *Dental caries* was diagnosed according to the diagnostic criteria for caries those proposed and published by the WHO[30]. The children were dentally examined by a paediatric dentist using an artificial light, dental mirror and dental explorer. DMFT scores, as a measure of dental health, were calculated for each child on the basis of clinical examination. Based on DMFT scores all children were divided into four groups; 1. caries-free children: DMFT = 0; 2. low caries intensity: DMFT = 1-2; 3. moderate caries intensity: DMFT = 3–4; and 4. high caries intensity: DMFT = 5–10.

2. *Dental anxiety* in children and their mothers was assessed by commonly used Corah's Dental Anxiety Scale (CDAS) measuring reactions, on a five point-scale, to four different dental treatment situations[31,32]. The questionnaires were administered to children and their mothers. Children and their mothers were asked to answer the questions contained in the CDAS.

The questionnaire was administered to the individual child before dental examination in the dental office after an explanation by one of the authors. Children were not permitted to confer with their mothers who were present during the completion of questionnaire. Mothers were asked to fill in the questionnaire during child testing. The test was shown to be valid and reliable in distinguishing between dental and non-dental anxiety[1,32]. All children were divided into three groups according to the CDAS score: 1. "low" CDAS: 4 – 8; 2. "moderate" CDAS: 9 – 12; 3. "high" CDAS: 13 – 20.

Differences between the groups were tested by Student's t test. Spearman's rank correlations were computed to examine the relationship between dental health status (DMFT), children's dental anxiety (CCDAS) and mothers' dental anxiety (MCDAS).

Results

CDAS scores were calculated for all children and their mothers. Because differences in DAS scores between males and females were not significant, data for both sexes were combined in this study. Based on the CDAS scores all children were divided into three groups: low, moderate, and high anxiety (Table 1). The majority of children displayed low dental anxiety (38.4%). Moderate dental anxiety was observed in 32.6%, and high dental anxiety in 29% of children.

TABLE 1

DISTRIBUTION OF CHILDREN ACCORDING TO THE LEVEL OF DENTAL ANXIETY

Group of children	CDAS range	N = 138	
		n	%
1. Low dental anxiety score	4 – 8	53	38.4
2. Moderate dental anxiety score	9 – 12	45	32.6
3. High dental anxiety score	13 – 20	40	29.0
TOTAL	–	138	–

N – number of subjects; CDAS – Corah Dental Anxiety Score

All children were divided into four groups according to the caries intensity: 1. caries free children: (DMFT = 0; N = 36 (26%); 2. low caries intensity: DMFT = 1–2; N=20, (14.5%); 3. moderate caries intensity: DMFT = 3–4; N=60 (43.5%); and 4. high caries intensity: DMFT = 5–10; N=22 (16%). Thirty six children (or 26%) were caries free, while 102 (or 74%) were caries-active.

Caries free children displayed a significantly lower mean CDAS score than children with low caries intensity ($t = 2.37$; $P < 0.05$; Table 2). Mothers' dental anxiety was not significantly higher in the group of children with low dental anxiety compared to the children with moderate dental anxiety.

Children with moderate caries intensity had a significantly higher mean CDAS score than caries free children ($t = 3.82$; $P < 0.001$; Table 3). Mothers of caries free chil-

dren and children with moderate caries intensity did not differ significantly in CDAS mean score.

TABLE 2

DIFFERENCES IN CDAS SCORES BETWEEN CARIES-FREE CHILDREN AND CHILDREN WITH LOW CARIES INTENSITY

TEST	CARIES-FREE CHILDREN (N=36)		CHILDREN WITH LOW CARIES INTENSITY (N=20)		t
	M	SD	M	SD	
CCDAS	7.77	3.19	10.50	4.46	2.37*
MCDAS	8.50	4.05	9.25	3.78	0.68 N.S.

CCDAS – Child Corah Dental Anxiety Score;

MCDAS – Mother Corah Dental Anxiety Score

N – sample size; M – mean; SD – standard deviation

* P <

N.S. - Not significant

TABLE 3

DIFFERENCES IN CDAS SCORES BETWEEN CARIES-FREE CHILDREN AND CHILDREN WITH MODERATE CARIES INTENSITY

TEST	CARIES FREE CHILDREN (N=36)		CHILDREN WITH MODERATE CARIES INTENSITY (N= 20)		t
	M	SD	M	SD	
CCDAS	7.77	3.19	10.60	3.94	3.82 ***
MCDAS	8.50	4.05	8.81	2.92	0.39 N.S.

*** P < 0.001

N.S. - Not significant

Table 4 shows differences in mean CDAS scores between caries free children and children with high caries intensity. The difference was found to be statistically significant (t = 3.63; P < 0.001). Mothers' mean CDAS scores of caries free children and children with high caries intensity did not differ significantly.

TABLE 4

DIFFERENCES IN CDAS SCORES BETWEEN CARIES-FREE CHILDREN AND CHILDREN WITH HIGH CARIES INTENSITY

TEST	CARIES FREE CHILDREN (N=36)		CHILDREN WITH HIGH CARIES INTENSITY (N= 22)		t
	M	SD	M	SD	
CCDAS	7.77	3.19	11.81	4.45	3.63 ***
MCDAS	8.50	4.05	10.50	3.39	1.70 N.S.

*** P < 0.001

N.S. - Not significant

Differences in mean DMFT scores between children with low CDAS scores and those with high CDAS scores were highly significant (t = 3.69; P < 0.001; Table 5). When comparing each component of the DMFT score, significant differences were obtained for the mean number of decayed (D) teeth (t = 4.43; P <0.001) but not for the mean number of missed (M) or filled (F) teeth.

TABLE 5

DIFFERENCES IN DENTAL HEALTH STATUS (DMFT) BETWEEN CHILDREN WITH LOW AND HIGH DENTAL ANXIETY

DENTAL HEALTH STATUS (DMFT)	CHILDREN WITH LOW CDAS (CDAS = 4 - 8) (N=53)		CHILDREN WITH HIGH CDAS (CDAS = 13 - 20) (N=40)		t
	M	SD	M	SD	
Carious (D)	0.54	0.99	1.87	1.86	4.43***
Missed (M)	0	0	0.10	0.45	-
Filled (F)	1.66	1.88	1.92	1.75	0.72 N.S.
DMFT	2.20	2.29	3.90	2.18	3.69***

*** P < 0.001

N.S. - Not significant

The calculation of Spearman's rank correlations revealed significant associations of children's DMFT scores and their CDAS scores (r = 0.3198; P < 0.001; Table 6). The CDAS scores in children showed significant association with CDAS of their mothers (r = 0.3886; P < 0.001). Mothers' CDAS score did not show significant correlation with children's dental status or DMFT score (Table 6).

TABLE 6

SPEARMAN'S RANK CORRELATIONS BETWEEN DMFT INDEX AND CDAS SCORE OF CHILDREN AND THEIR MOTHERS

	DMFT	CCDAS	MCDAS
DMFT	1.000	.3198***	.1452
	-	.0002	.0891 n.s.
CCDAS	.3198 ***	1.000	.3886 ***
	.0002	-	.0000
MCDAS	.1452	.3886 ***	1.000
	.0891 n.s.	.0000	-

DMFT Index; CCDAS – Child Corah Dental Anxiety Scale;

MCDAS – Mother Corah Dental Anxiety Scale

*** P < 0.001; n.s. – not significant

Discussion

The results in the present study show significant differences in dental anxiety (DA) scores between children with moderate and high caries intensity and caries free children. Children with high caries intensity displayed

significantly higher DA scores than caries free children. There were no significant differences in DA scores between boys and girls.

Data on the association of dental anxiety and child dental health are controversial in the literature. Some studies report on association between children's DA and dental health status[6,16,22–25]. Kruger et al.[23] stated that dental fear is likely to be a significant predictor of dental caries and may be a risk factor for incidence of dental caries. It is considered that dental anxiety in children leads to a whole range of adverse behavioural and dental health characteristics including poor dental care and poor dental health. Avoidance of dental settings results in a high rate of untreated dental caries. Some studies have shown that high dental anxiety leads to high caries prevalence in children, less fissure sealants, more untreated caries, and more gingivitis. Dental anxiety leads to the avoidance of dental treatment and high DMFT values. In general, children with high DA avoid dental visits and display poor dental health[6,16,22–25]. Other studies have failed to establish significant correlations between children's DA and dental health[7,8,28,29]. Boka et al. [28] did not found any association of dental fear assessed by CFSS-DS and dental caries.

The number of decayed (D) teeth was significantly higher in the group of examined children than the number of filled (F) teeth. It could be explained by children's low care for dental health and avoidance of dental treatment. A possible explanation could also be that the caries experience of anxious children have been analysed for the whole sample regardless of the caries intensity. In the present study we obtained significant differences in CDAS scores between caries-free children, and children with moderate and high caries intensity. When individual components of DMFT index were analysed, only the mean number of decayed teeth (D) was significantly higher in children with high CDAS than in children with low CDAS (1.87 respectively 0.54; $T = 4.43$; $P < 0.001$).

DA in children and their mothers in the present study was assessed by using the CDAS instrument. So far, various instruments have been developed to measure dental anxiety in children. CDAS was primarily developed to measure dental anxiety in adults but it was successfully used in many studies with children. The DFSS-DS was developed to measure DA in children and it is considered to be highly reliable[5,33,34].

Some recent studies have shown that CDAS can be used successfully for the assessment of dental anxiety in children aged 10 – 15 years[35]. A strong correlations between CDAS and Children Fear Survey Schedule – Dental Subscale (CFSS-DS) scores were obtained in the sample of 250 children aged 10 – 15 years ($r = 0.700$; $P < 0.001$). CFSS-DS is very frequently used for assessing child dental anxiety and it is considered to be very reliable. It covers more aspects of the dental situations and should be preferred over other instruments for assessing child dental anxiety[5,33, 34].

On the other hand, CDAS is simpler to administer and is more suitable for comparison of DA in children and adults when the same instrument is used[36]. Its use can be problematic in younger children if they are not capable to understand the questions from this instrument. Some studies have shown that CDAS can be used successfully even in younger children if the particular items of the instrument are well explained to the children[36]. CDAS was successfully used in many studies with children aged 10 – 12 years[4,35–37]. It shows good reliability and stability, and a significant relationship to Frankl's Rating Scale[33]. Very high correlations were established between CDAS and CFSS-DS scores obtained on the sample of children[35,38]. It could be concluded that both instruments offer good assessment of children's dental anxiety.

The results from the present study show that maternal CDAS mean scores do not differ significantly in the group of caries free children and children with high caries intensity. On the other hand, mothers' DA scores show significant correlation with children's DA scores. Mother-child relationship has been found to be very important in the pre-school years and it strongly influences many anxious reactions of the child in dental situations. Child behaviour in dental office is related to the level of maternal dental anxiety. It seems that parental attitudes towards medical and dental treatment have profound influence on the future child's behaviour in different dental situations. The research demonstrates a significant relationship between children's behaviour and the level of their mothers' dental anxiety measured by CDAS. Studies have suggested that parental dental fear is positively associated with their children's fear and that fathers play a relevant role in the transfer of dental fear to children[17,18]. However, mothers' attitudes toward dentistry are strongly related to the oral status of their children[39,40]. Bankole et al.[40] reported that levels of dental anxiety in children and their mothers appeared to predict their behaviour in oral care settings. To establish good relationships with paediatric dental patients and their mothers, dentists need to recognize and reduce their anxiety during dental treatment. It has been found that maternal factors are significantly related to children's dental caries status. Untreated dental caries in children shows a significant association with maternal oral health-related knowledge[41].

On the basis of the results obtained in the present study it could be concluded that children's dental anxiety is strongly related to their mothers' dental anxiety. Dental anxiety in children is strongly associated with their dental health. Children with high level of dental anxiety show significantly higher mean DMFT scores. The correlation between CDAS scores for children and their mothers is highly significant. There was no correlation between mothers' dental anxiety and child dental health.

Dental anxiety is a serious problem which negatively affects oral health of children and adults. Early detection of the causes of fear is very important in the solution of the problem. It is recognized that children who witness fear in their parents are likely to develop dental anxiety

and poor dental health status. Every effort should be made to evaluate the child for dental fear prior to dental treatment so that each child can be managed distinctively based on the reasons which mainly contributed to the development of dental anxiety. Dentists need to establish good relationship with children to reduce their anxiety before and during dental procedures. All initial dental procedures in children should be completely painless and pleasant experience.

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DENTALNA ANKSIOZNOST U DJECE U ODNOSU NA DENTALNO ZDRAVLJE

S A Ž E T A K

Cilj ovog istraživanja bio je procijeniti utjecaj dentalne anksioznosti na dentalni status djece i utvrditi stupanj povezanosti između majčine dentalne anksioznosti i dentalne anksioznosti djeteta. Istraživanje je provedeno na uzorku od 138 parova majki i njihove djece u dobi od 11 – 12 godina. Za procjenu anksioznosti u djece i njihovih majki korištena je Corahova skala dentalne anksioznosti (CDAS). Kao mjera dentalnog zdravlja korišten je KEP indeks zuba (DMFT). Stupanj povezanosti analiziranih parametara procijenjen je pomoću Spearmanovih korelacijskih koeficijenata. Pacijenti su bili podijeljeni u slijedeće skupine: 1. niska dentalna anksioznost (CDAS = 4-8; N=53), 2. umjerena dentalna anksioznost (CDAS = 9-12; N = 45), i 3. visoka dentalna anksioznost (CDAS = 13-20; N = 40). Sva su djeca bila podijeljena u četiri skupine na temelju DMFT indeksa: djeca bez karijesa: DMFT = 0; nizak intenzitet karijesa: DMFT = 1-2; umjereni intenzitet karijesa: DMFT = 3-4; i visoki intenzitet karijesa: DMFT = 5-10. CDAS vrijednosti djece pokazale su značajnu korelaciju s DMFT indeksom ($r = .3198$; $P < 0.001$) i majčinim CDAS vrijednostima ($r=.3886$; $P<0.001$). Djeca s visokim intenzitetom karijesa pokazivala su značajno višu srednju CDAS vrijednost (11.81) nego djeca bez karijesa (7.77) ($t = 3.63$; $P < 0.001$). Rezultati su pokazali da je dentalna anksioznost u djece povezana s anksioznosti njihovih majki ($r = 0.388$, $P < 0.001$). Visoko anksiozna djeca pokazala su značajno viši DMFT indeks od djece s niskom anksioznosti ($t = 3.69$, $P < 0.001$). Rezultati pokazuju značajnu povezanost između djetetove dentalne anksioznosti i dentalnog zdravlja. Djeca s visokom dentalnom anksioznosti pokazivala su značajno viši intenzitet karijesa. Dentalna anksioznost majki pokazivala je značajnu povezanost s dentalnom anksioznosti djeteta, ali ne i s djetetovim dentalnim zdravljem.