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Dental avoidance behaviour in parent and child as risk indicators for caries in 5-year-old children

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Aim. The aim of this study was to explore associations between avoidance behaviour and dental anxiety in both parents and children and caries experience in 5-year-old children. It was hypothesised that parents' dental avoidance behaviour and dental anxiety were related to dental caries in 5-year-old children.

Design. Data were collected from dental records and by clinical and radiographic examination of 523 children. The parents completed a questionnaire regarding education, national background, dental anxiety, dental attendance, and behaviour management problems. Bivariate and multivariate logistic regression was conducted.

Results. Children having one or more missed dental appointments (OR = 4.7), child behaviour management problems (OR = 3.3), child dental anxiety (OR = 3.1), and parents avoiding dental care (OR = 2.1) were bivariately associated with caries experience at the age of 5 years. In multivariate logistic regression, having one or more missed dental appointments (OR = 4.0) and child behaviour management problems (OR = 2.4) were indicators for dental caries in 5-year-old children, when controlling for parents education and national origin.

Conclusion. Parents that avoid bringing their child to scheduled dental appointments and previous experiences of behaviour management problems for the child indicated risk for dental caries in 5-year-old children.

Introduction

Dental caries is a common disease among preschool children. The prevalence has declined in recent years and the major part of the disease is found in a minor part of the children[1–3]. During the last decades a strategy for preventing dental caries targeting children at high risk of dental caries has been advocated in the Nordic countries[4]. Preferably identification of children at risk of developing dental caries should be carried out before clinical signs of caries are obvious. Identification of children at risk based on characteristics of the parents would be less time- and resource demanding compared with clinical examination of the children. Associations between dental caries and parents' education and ethnicity have been documented[5]. Nevertheless, the relationship between other parental characteristics and dental caries in preschool children are not fully understood.

Both child dental anxiety and behaviour management problems are well known as barriers to dental care for children. The prevalence of these problems is reported to be approximately 10%[6], and they are more frequent in preschool children than in school children[7]. Dental anxiety is associated with avoidance of dental treatment[8] and deteriorated dental health[9,10], and children with dental anxiety problems are reported to have more carious surfaces and more missed dental appointments than other children[11–13]. Behaviour management problems are more common among children with missed dental appointments, and children with these problems are reported to have more carious and fewer filled surfaces than other children[14]. For both dental anxiety and behaviour management problems pain and negative experiences with dental treatment are often considered as major reasons[15].

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The acquisition of dental fear is described through three pathways; direct conditioning, modelling and information/instruction[16]. Among children direct conditioning i.e., subjective experiences with dental treatment seems to play a major role in development of dental anxiety[17]. Through modelling and information/instruction parents' dental anxiety is considered to be of importance[15]. Dental anxiety of the mothers has been shown to be strongly correlated to child dental anxiety[11], and high frequency of behaviour management problems have been found among children of parents with high dental anxiety[18].

Health-related practises of family members are derived through norms of the family[19]. It has been reported that parents' oral health behaviours and attitudes towards oral health are associated with child dental health[20–22], and that mother's attitudes and beliefs about dental care are major determinants of whether she takes her child to dentist[23]. Mother's dental anxiety and dental attendance pattern are suggested as indicators of preschool child dental health and for taking the child to dental care[24], but the relationship is still unclear and need to be further explored.

The objective of this study was to explore the associations between dental avoidance behaviour and dental anxiety in both parents and children and dental caries experience in 5-year-old children. Based on previous research it was hypothesised that parents' and children's dental avoidance behaviour and dental anxiety were related to child dental health, and thereby could be assessed as risk indicators for dental caries in 5-year-old children.

Material and methods

Study population and sampling procedure

All children in Norway are offered free comprehensive dental care from birth in the Public Dental Services. In 2007, 96% of the 5-year-old children were enrolled in the services and according to national statistics from the Public Dental Services 77% of the children were dentin-caries free[3]. The county of Akershus has more than 500 000 inhabitants, comprising 11% of the Norwegian population. The dental health of 5-year-old children in the county (80% dentin caries free in 2007) was at about the same level as the national.

In 2007, about 7.5% of Akershus-resident 5-year-old children enrolled in the Public Dental Services were invited to participate in this study. Power calculation was performed based on a caries prevalence of 20%, precision of 0.05 (a = 0.05) and a power of 80% (b = 0.20) giving a sample of 275 children for bivariate analysis. To allow multivariate analysis the sample size was increased to approximately 500 children. The children (n = 536) were selected from all the 32 dental clinics, and the number in each clinic was proportional to the total number of 5-year-old children enrolled in the clinic. The children were randomly selected and invited to participate in connection with their scheduled clinical recall examination. Twelve families with thirteen children refused to participate. The caries experience was not significantly different between nonparticipating and participating children (31% *vs* 34%, P = 0.82). The final study included 523 children, 259 boys and 264 girls. Mean age at the examination was 4.9 years (SD = 0.3; range 4.1–5.8 years).

Method

Data were collected from dental records, by clinical and oral radiographic examinations of the children and by questionnaires filled in by the parents at the dental visits.

Clinical examination

The clinical examinations of the children, by use of mirror and probe, were performed by one experienced paediatric dentist (TIW). Bitewings were taken in accordance with standard routines in the Public Dental Services and used as an adjunct to the clinical caries registration for all children in this study (except for uncooperative children, 12.8%).

Caries experience was registered with the surface as the unit of measurement[21]. Surfaces were given a code according to status:

sound (s), decayed (d), filled (f) or missing because of caries (m). Five caries graduations were recorded (d_1–d_5)[25]. Grades d_1 and d_2 were enamel lesions and grades d_3, d_4, and d_5 were dentine lesions. In this study only lesions extending to dentine were categorised as caries, and the children were categorised as having caries experience or not.

Intra-examiner agreement was tested using extracted teeth, radiographs and by re-examination of 34 children after a 30-day interval. The extracted teeth and radiographs were examined three times during the study period with intervals of about 90 days. Cohen's kappa for intra-examiner agreement was 0.61 (extracted teeth), 0.85 (radiographs) and 0.88 (re-examination of children), categorised as 'substantial to almost perfect agreement'[26].

Missed dental appointments of the children were used as one of the indicators of dental avoidance behaviour in parents (in addition to parental self-reports of dental attendance). The number of missed appointments were registered from the dental records and categorised into no *versus* one or more missed appointments.

Questionnaire

A questionnaire was completed by the accompanying parent; 60% mothers, 39% fathers, and 1% others (grandparents/aunts) while the child was clinically examined. Other accompanying persons were classified according to gender.

In addition to education and national background the questionnaire included variables measuring parents' dental anxiety and dental attendance, and children's dental anxiety and behaviour management problems.

Dental anxiety among parents was measured using Corah's Dental Anxiety Scale (DAS)[27]. The scale 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). The scale has been widely used and psychometrically evaluated, also in Norway[28]. The DAS-score were dichotomised into low dental anxiety (DAS < 13) and high dental anxiety (DAS ≥ 13)[29].

Dental attendance. The parents were asked about their own dental attendance pattern with response alternatives: have a dentist to go to, and are regularly recalled (1), have a dentist to go to, and call for appointment when I need one (2), have no dentist to go to, and have to find one if I need one (3), and never go to the dentist (4). The responses were dichotomised into whether they had a dentist to go to (1 and 2) or not (3 and 4).

Dental anxiety in the 5-year-old children was based on the parents' responses to the statement 'my child is anxious of dental visit' on a five point Likert scale ranging from strongly agree (1) to strongly disagree (5). The answers were dichotomised into the categories high dental anxiety (1 and 2) and low dental anxiety (3–5).

Behaviour management problems during the children's previous dental visits were based on the parents' response to the statement 'my child has had problems in previous dental visits' on a 5-point Likert scale ranging from strongly agree (1) to strongly disagree (5). The answers were dichotomised into the category agree (1 and 2) and disagree (3–5).

Educational level of the parents was measured as total number of years in school. More than 12 years was defined as high education while 12 years or less was defined as low education. Mother's and father's education was combined into one variable: parents' educational level and dichotomised into high education when both parents reported high education and low education when one or both parents reported low education.

National origin was recorded according to mother's and father's country of birth. Mother's and father's national origin was combined into one variable and dichotomised into both parents with western origin and one or both parents with non-western origin. Non-western origin included parents born in Asia, Africa, South America, Central America, and Eastern Europe.

Data analyses

The statistical analyses were performed using the SPSS (SPSS, Inc. Chicago, IL, USA), version 16.0. Bivariate and multivariate logistic

regression analyses were conducted with children's caries experience or not as the dependent variable. Variables that were statistically significant in the bivariate analyses were included in the multivariate analysis. Parents' gender, education, and national origin were included as control variables. Results were reported using odds ratio (OR), 95% confidence interval (CI) and *P*-value (*P*). Spearman's correlation was used to explore associations between the independent variables before the multivariate analyses were conducted. The level of statistical significance was set at 5%.

Ethical considerations

Written, informed consent was obtained from all parents. The study was approved by the Regional Committee for Medical Research Ethics and The Norwegian Social Science Data Services.

Results

The distribution of parents and children according to demographics, self-reports, and information extracted from the dental records is presented in Table 1.

The vast majority of the parents (92%) reported that their children had no behaviour management problems during previous dental visits, and that the children had low dental anxiety (94%). The majority of the children had no missed dental appointments (92%) and had parents who reported having a dentist to go to (86%). Seven per cent of the parents reported high dental anxiety (DAS ≥ 13). Mothers reported higher frequency of dental anxiety than fathers, 10% *vs* 3% ($P = 0.002$).

The caries prevalence in the children was low and 82% had no caries experience. Details on caries prevalence and distribution have been presented previously[21].

Bivariate and multivariate analyses

In the bivariate analyses having caries experience at the age of 5 years was associated with the child having one or more missed dental appointments (OR = 4.7), the child having behaviour management problems during previous dental visits (OR = 3.3), child dental anxiety (OR = 3.1) and parents reporting not having a dentist to go to (OR = 2.1) (Table 2).

In multivariate logistic regression analysis, parents' dental attendance, the child having missed at least one dental appointment, child dental anxiety, and behaviour management problems during previous dental visits were entered as explanatory variables (Table 2). Parents' education and national origin were entered as control variables. A child that had one or more missed dental appointments had 4.0 times higher probability of having caries experience than children with no missed appointments. If the parents reported that the child had previous behaviour management problems during dental care the probability of having caries experience at the age of 5 years was 2.4 times higher than for children whose parents did not report these problems. Variables included in the analysis explained 24% of the variance in the probability of having caries experience at the age of 5 years.

Table 1. Description of independent variables.

	All children (*N* = 523)
Children	
Behaviour management problems during previous dental visits	
No	484 (92)
Yes	39 (8)
Dental anxiety	
Low	494 (94)
High	29 (6)
Parents	
Missed the child's dental appointment	
No	457 (92)
Yes	39 (8)
Having a dentist to go to	
Yes	452 (86)
No	71 (14)
Dental anxiety	
Low (DAS < 13)	484 (93)
High (DAS ≥ 13)	35 (7)
Parents' origin	
Western	453 (87)
Non-western	70 (13)
Parents' education	
High	280 (56)
Low	222 (44)
Parent	
Mother	317 (61)
Father	206 (39)

Values are given as n (%).

Table 2. Caries experience in 5-year-old children according to missed dental appointments, behaviour management problems, dental anxiety, dental attendance and socioeconomic characteristics. Bivariate (*N* = 523) and multivariate logistic regression (*N* = 492*).

	Children with caries experience			
	Bivariate		Multivariate	
	OR	95%CI	OR	95%CI
Missed dental appointments				
No (ref)				
Yes	**4.7**	**2.4–9.4**	**4.0**	**1.8–8.6**
Behaviour management problems during previous dental visits				
No (ref)				
Yes	**3.3**	**1.7–6.6**	**2.4**	**1.0–5.7**
Child dental anxiety				
Low (ref)				
High	**3.1**	**1.4–6.9**	2.6	0.9–7.2
Parents having a dentist to go to				
Yes (ref)				
No	**2.1**	**1.2–3.8**	1.0	0.5–2.2
Parents dental anxiety				
Low (ref)				
High	1.0	0.4–2.4	–	–
Parents' origin				
Western (ref)				
Non-western	**7.0**	**4.0–12.0**	**4.8**	**2.6–9.0**
Parents' education				
High (ref)				
Low	**3.4**	**2.1–5.6**	**2.8**	**1.6–4.8**
Parents				
Mother (ref)				
Father	1.3	0.8–2.1	–	–

Results significant at 5% level marked in bold. ref = reference category. Nagelkerke R^2 = 0.24.
*Reduced because of internal drop-out.

Discussion

The primary aim of this study was to explore possible relationship between the parental and child characteristics dental avoidance behaviour and dental anxiety and dental caries in 5-year-old children. The results showed that previous experiences of missed appointments (parents did not bring their child to the dentist) and child behaviour management problems were related to caries experience at the age of 5 years, when controlling for gender, education, and cultural background.

A random sample of 5-year-old children from a county in Norway with low caries prevalence was included in the study. The study was conducted in conjunction with the child's regular dental examination in the Public Dental Services, and included children and parents willing to participate (98%). No difference in caries prevalence was found between the children in the group that did not participate and children in the study group.

The caries registration in this study was detailed with radiographs used in adjunct to the clinical registration[21]. Information on missed dental appointments was collected from the dental records and uncertainty about the reliability of the recordings may exist. It is important, however, for the dental personnel to document to the employer and the parents that an appointment really did exist at that time, and the electronic dental record used makes it easy to document missed appointments. The impression was that missed appointments were faithfully reported. Reliability problems of data extracted from dental journals and bias caused by parents' recall are usual problems in survey research. We assess the results as representing 5-year-old children in Akershus, Norway, and consider that the associations found may be generalised to other populations with similar characteristics.

In the studied population, 8% of the 5-year-old children had missed at least one dental appointment. When a preschool child do not show up for a scheduled dental appointment this is not result of the child's behaviour. Even if the avoidance behaviour may be influenced by the child's unwillingness, it is the responsibility of the parents to bring their preschool child to the dentist. When a child is not showing up for a scheduled dental appointment this is because the parents do not bring their child and this behaviour may reflect parents' negative beliefs and attitudes towards dental care[23].

These results signify the importance of establishing early contact with parents of children who do not show up for scheduled appointments to explore possible barriers for bringing their child to the dentist. Strategies aimed at changing behaviour of the parents may represent an important part of caries prevention for children. Missed dental appointments have been reported to be associated with caries prevalence in older children[30,31], and dental treatments because

of toothache have been reported to be associated with missed dental appointments among 6- to 8-year-old Danish children[13]. Focusing on prevention of further missed dental appointments in preschool children may be less resource consuming than performing more complicated dental treatments as a result of caries in later life[32].

Behaviour management problems were in this study related to having caries in 5-year-old children. This finding support results among Swedish children aged 4–11 years, where a higher frequency of caries experience have been reported in children with behaviour management problems than in other children[14]. The reason for behaviour management problems in the dental situation is multifactorial[6]. This may represent immaturity in the child or more complex problems, such as a burdensome life or family situation[33]. Behaviour management problems in preschool children may partly be caused by early caries and previous dental treatment in a small child not able to cope with the treatment. In situations where the treatment need is not in accordance with the child's ability to cope with the treatment, behavioural, and pharmacological techniques should be applied. The findings also support the importance of giving young children with behaviour management problems appropriate care including caries prevention instead of waiting for child development and maturity[14] as these children at the age of 5 years have higher probability of caries than other children.

Only 14% of the children had parents reporting not having a dentist to go to, and a higher number of this group had non-western background and low education. Having a dentist to go to should not be a problem in the area where this study was performed. The reported lack of a dentist to go to may reflect low priority and negative attitudes to dental care[34]. It has been reported that parents who do not prioritise their own dental attendance will not take their child to dental examination[23,24]. Controlling for cultural background may explain why the parents' self report of dental attendance was not associated with caries experience in the multivariate model.

Child dental anxiety has been reported to be associated with caries experience in the previous studies in children[11,12]. In this study child dental anxiety was related to caries experience in bivariate analysis but not in the multivariate model. Child dental anxiety was associated with child behaviour management problems in previous dental visits (results not shown), which may explain why the association did not remain significant in the multivariate model. Parents' dental anxiety has been reported to be associated with caries experience in children[11], but this association was not confirmed in this study.

In conclusion, parents who avoid bringing their child to scheduled dental appointments and child behaviour management problems in early dental visits increased the risk of having caries experience at the age of 5 years.

What this paper adds

- This study showed that if parents failed to bring their child to the dentist at early age, the child had higher probability of having caries experience at the age of five compared with children who attended previous appointments.

Why this paper is important to paediatric dentists

- These results signify the importance of establishing early contact with parents of children who do not show up for scheduled appointments, to explore possible barriers for bringing these children to the dentist. This may provide opportunities to deliver appropriate dental care including prevention to children with high caries risk.
- Change of parental behaviour may represent an important part of caries preventive strategies for children.
- Parental avoidance behaviour was associated with probability of caries in preschool children, and should be considered when children's caries risk is evaluated.

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