DOI: 10.1111/j.1365-263X.2008.00944.x

Dental anxiety among survivors of childhood cancer: a cross-sectional study

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International Journal of Paediatric Dentistry 2009; 19: 121–126

Background. Childhood cancer survivors may have experienced a high number of invasive medical and dental procedures which are known to be risk factors for dental anxiety.

Aim. The aim of this study was to examine the prevalence of dental anxiety among children who have survived cancer.

Design. In a cross-sectional study, we examined 51 6- to 14-year-old children who had been treated for cancer at Aalborg Hospital, and 192 children without cancer. All children answered the Dental Subscale of the Children's Fear Survey Schedule. Dental anxiety was defined as a dental anxiety score exceeding the mean dental anxiety score + 1 standard deviation for the children without cancer.

Results. Children with cancer did not have an increased prevalence of dental anxiety compared with children without cancer: the prevalence ratio was 0.41 [95% confidence interval (CI): 0.10–1.24]. The mean dental anxiety score was 23.1 (95% CI: 21.2–25.0) among children who had been treated for cancer, and 24.7 (95% CI: 23.4–26.0) among children without cancer (mean difference: 1.6; 95% CI: 1.1–4.3).

Conclusion. Cancer and cancer treatment during childhood were not associated with an increased risk of dental anxiety in this population.

Introduction

The incidence of childhood cancer in the Western countries has risen during the past decades, and survival after childhood cancer has improved[1,2]. The improved survival rates are accompanied by concerns about long-term general as well as dental health consequences of childhood cancer and its treatment[3,4]. Concerns regard physical health and, increasingly, also the psychological consequences of childhood cancer. In general, young childhood cancer survivors are psychologically in good health, but the conclusions of previous research are conflicting. One aspect of psychological health is the level of anxiety. Some studies have reported increased anxiety levels among childhood cancer survivors compared with healthy controls[5–7], whereas others have reported no such differences[8,9].

Prior to cancer therapy, some children may experience invasive, hasty dental treatment like cavity preparations, injections of local anaesthesia, or tooth extractions in order to eliminate possible infectious foci before cancer therapy[10,11]. Such invasive dental treatment combined with the intense medical treatment and increased general anxiety levels are theoretical sources of dental anxiety[12,13].

The association between cancer treatment in childhood and the risk of dental anxiety has, to our knowledge, never been examined. Absence of dental anxiety is essential to good oral health[14], and this issue is therefore relevant for cancer survivors and health professionals. The aim of the present study was to examine the association between cancer treatment and dental anxiety among children.

Materials and methods

Design and study population

This cross-sectional study was performed among children aged 6 to 14 years in Region North

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Jutland, Denmark. Denmark's population is about 5.4 million people, of whom approximately 17% are children younger than 15 years. The incident number of cancer cases among Danish children is approximately 150 per year[15].

We included children who were in remission after cancer treatment at the Department of Pediatrics, Aalborg Hospital. Children suitable for participation were identified by the consultant responsible for the cancer treatment together with two nurses who had been employed at the Department of Pediatrics for several years. The criterion for selection was that the child should be able to understand the questionnaire measuring dental anxiety (i.e. children with cognitive difficulties consequential to cancer or cancer treatment were excluded). All parents of the selected children were then contacted by telephone by one of the two nurses and asked for consent to their child's participation. The children received a written questionnaire and answered the questionnaire at home. In the cover letter, the child was instructed to complete the questionnaire alone or with help from a parent. As comparison group, classmates to seven children with cancer were included. The selection of the seven children with cancer was done by the consultant of the Department of Pediatrics at Aalborg Hospital, and based on a personal knowledge of the children and their families, while they had no knowledge of their level of their dental anxiety. The parents of children with cancer were asked for permission to contact their children's schools. The heads of the schools were then contacted for permission to obtain questionnaire answers from the cancer child's classmates. After obtaining the necessary permissions, one of the nurses visited the class. All children, including the one with cancer, answered the questionnaire while the nurse and their teacher were present at the classroom.

Measure of dental anxiety

All children answered a Danish version of the Children's Fear Survey Schedule–Dental Subscale (CFSS–DS)[16,17]. The CFSS–DS questionnaire consists of 15 items, each covering different aspects of dental and medical situations. The possible response to each item is a score between 1 (not afraid) and 5 (very afraid). The total scores range between 15 and 75, with a high score indicating dental anxiety. Dental anxiety was defined as a dental anxiety score exceeding the mean dental anxiety score + 1 standard deviation (SD) for the children without cancer. Children with cancer were compared with children without cancer with respect to the prevalence of dental anxiety and mean dental anxiety score.

For questionnaires not containing answers on all items, the CFSS–DS score was calculated as the mean CFSS–DS score divided by the number of items answered multiplied by 15. That is, the value of a missing item was replaced by the individual CFSS–DS score divided by the individual number of answered items. Questionnaires with more than four missing CFSS–DS item answers were excluded from further analysis.

The Danish Data Protection Agency approved the study (record no.: 2004-41-4280).

Data analysis

We used STATA software, version 9.0 (StataCorp, College Station, TX, USA) for analysis.

Results

Parents of 59 children with cancer gave permission to their child's participation. Fifty-one children with cancer and 192 classmates answered 11 or more of the CFSS–DS questions and were thus included in the analysis. Thirty-two children had leukaemia or lymphoma, 14 children had solid non-CNS tumours, and two children had CNS tumours. For three children with cancer, we had no information on the specific cancer diagnosis.

Four children (7.8%) with cancer and 30 children (15.6%) without cancer had dental anxiety. Children with cancer did not have an increased prevalence of dental anxiety (prevalence rate ratio 0.50 with 95% CI: 0.19–1.35).

The overall mean dental anxiety score was 24.4 (SD = 8.6). The mean dental anxiety scores according to gender, age, and cancer type by cancer status are presented in Table 1. The mean dental anxiety score was 23.1 (95% CI: 21.2–25.0) among children with cancer

Table 1. Mean Children's Fear Survey Schedule–Dental Subscale score (with 95% CI) according to gender, age, and cancer status, and prevalence of children with dental anxiety.

	Children	
	With cancer	**Without cancer**
Gender		
Girls	23.2 (20.4–26.0)	26.5 (24.8–28.2)
Boys	23.0 (20.2–25.8)	23.2 (21.3–25.1)
Age (years)		
6–9	24.1 (21.2–27.0)	25.7 (23.1–28.3)
10–14	21.9 (19.5–24.3)	24.3 (22.9–25.7)
Cancer type		
Leukaemia/lymphoma	22.2 (19.9–24.5)	–
Solid non-CNS tumour	24.4 (20.9–27.9)	–
Total	23.1 (21.2–25.0)	24.7 (23.4–26.0)

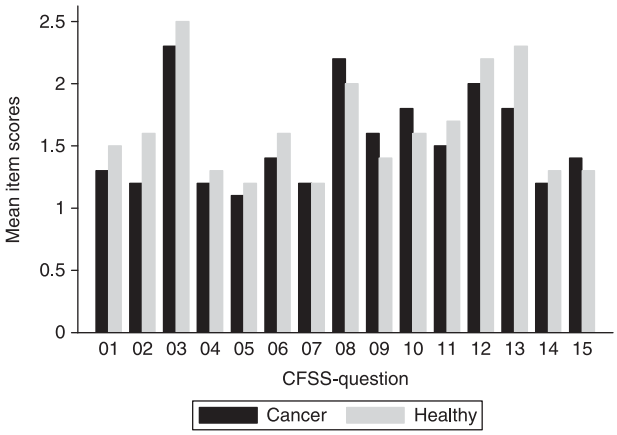

Fig. 1. Mean item scores on the Children's Fear Survey Schedule–Dental Subscale among children in remission after cancer and in healthy children.
*CFSS questions: (1) dentists; (2) doctors; (3) injections; (4) having somebody examine your mouth; (5) having to open your mouth; (6) having a stranger touch you; (7) having somebody look at you; (8) the dentist drilling; (9) the sight of the dentist drilling; (10) the noise of the dentist drilling; (11) having somebody put instruments in your mouth; (12) choking; (13) having to go to the hospital; (14) people in white uniforms; and (15) having the nurse clean your mouth.

and 24.7 (95% CI: 23.4–26.0) among healthy children. The mean difference was 1.6 (95% CI: 1.1–4.3). The mean dental anxiety score in children with solid non-CNS tumours was higher than in children without leukaemia or lymphomas. Healthy girls had a higher mean dental anxiety score than girls with cancer and than boys, irrespective of their cancer status.

The mean dental anxiety score for girls was 25.8 (95% CI: 24.3–27.3), for boys 23.1 (21.5–24.7), for children below the age of 10 years 25.2 (95% CI: 23.2–27.2), and for children of 10 years of age or more 23.9 (95% CI: 22.6–25.2).

The scores for each of the items according to cancer status are presented in Fig. 1. Compared with healthy children, children with cancer seemed to score lower on all questions except questions 8 ('the dentist drilling'), 9 ('the sight of the dentist drilling'), and 10 ('the noise of the dentist drilling').

Discussion

This study analysed 243 6- to 14-year-old children and measured dental anxiety by means of the CFSS–DS. We found no difference in the prevalence of dental anxiety or mean anxiety score between healthy controls and children who had undergone treatment for cancer.

Factors related both to the dental treatment and to the cancer treatment may explain our findings. First, knowing the cancer status of a child, the dental health professionals most likely strive to treat the child very gently, being careful about avoiding pain. According to the theory of 'latent inhibition', going through pain-free dental treatment prevents development of dental anxiety[17–20]. Second, dental treatment seems very easy to go through compared with the extensive medical treatment in cancer therapy. Third, during cancer therapy, the children may have developed effective coping strategies in the form of techniques, thoughts, and behaviours used to deal with stress that may also protect against dental anxiety[5,21]. Because the medical team is experienced and committed to deal with children who go though pain-full treatments, the learned coping strategies may partly be a result of trustful relationships between the children and the medical team. Later on, the children may be able to establish such relationships with other health professionals like the dental team. On the other hand, the children with cancer in our study scored slightly higher on three CFSS–DS questions mentioning the word 'dentist's drill', while lower on the remaining 12 questions. This suggests that they may be more afraid of the dentist's drill than healthy children.

A report from the UK found that one-third of women in remission after breast cancer felt anxious about injections[22]. This finding corresponds to our findings that 33.3% of the children with cancer were afraid of injections, but among healthy children the percentage was even higher (38.5%). We have previously shown that 41.6% of Danish 6- to 8-year-olds answered that they were 'a fair amount' to 'very afraid' of injections[17]. Our findings thus seem to contradict the theory that the experience of cancer therapy increases the risk of needle phobia among children.

Our data indicated that girls with cancer had less dental anxiety than healthy girls, while this difference was not seen among boys. This result was surprising in light of findings by Kazak *et al.* who demonstrated that male cancer survivors were less anxious than healthy males[23]. Owing to the small study size, our result should be interpreted with caution. A study of adolescents undergoing scheduled surgery found that compared with boys, adolescent girls anticipated more pain, were more anxious, and tended more to seek emotional support prior to surgery[24]. The majority of children with cancer have numerous experiences with situations comparable with scheduled surgery. The results by Logan and Rose[24] showed that girls are more anxious than boys prior to a first-time alarming situation, but owing to their tendency to seek emotional support, they may gradually develop more effective coping strategies during the course of cancer treatment.

We found that the mean dental anxiety score was slightly lower in children with leukaemia/lymphomas than in children with solid non-CNS tumours. This possible difference may be linked to the specific cancer treatment (i.e. the frequency of major surgery).

Our data showed lower mean dental anxiety scores among boys than among girls. This is consistent with results from other studies using the same questionnaire[25–27]. The finding of lower mean dental anxiety scores with increasing age is also in agreement with results from other studies[16,28].

Our study has several limitations. Because of the cross-sectional design, we had no information on whether the cancer treatment preceded the dental anxiety. The study was not population based, because children with some cancer forms from the region are referred to hospitals other than Aalborg for treatment. The Department of Pediatrics, Aalborg Hospital, might differ from other similar Danish departments regarding oral care or psychological support offered to the children and their families while hospitalized. For the same reasons, our results may not apply to populations outside Denmark. A third reason for limited generalizability is that the Danish Law of Dental Service guarantees universal free dental care to children until they reach the age of 18 years. The child dental care service accordingly offers multiple free visits to children with special need of habituation to dental treatment, thereby reducing the risk of dental anxiety. Further, in our study, there is a lack of clinical details. For example, we had no information on painful dental treatment or behaviour problems during dental treatment and were therefore unable to account for the effect of these factors. Finally, we could not adjust for socioeconomic status. Previous studies have shown that low family income or low educational attainment is associated with an increased risk of anxiety in childhood cancer survivors[29] as well as dental anxiety in children[30].

We conclude that cancer treatment during childhood is not associated with an increased risk of dental anxiety.

What this paper adds

- This paper is the first to report the risk of dental anxiety among survivors of childhood cancer.

Why this paper is important to paediatric dentists

- This paper shows that children who experienced intense medical treatment during childhood seem to have a good resistance with respect to dental anxiety.

Acknowledgements

We wish to thank the nurses Grethe Mortensen and Kit Aaen, Aalborg Hospital, for their practical help; children and parents for answering the questionnaires; and teachers and heads of schools for cooperativeness. The study was funded by The Danish Cancer Society, The Swedish Children's Cancer Foundation, Boernecancerfonden, The Clinical Epidemiological Research Foundation, The Western Danish

Research Forum for Health Sciences, Karen Elise Jensen Foundation, 'Dagmar Marshalls Fond', 'Aase og Ejnar Danielsens Fond', 'Apotekerfonden', and Aalborg Hospital.

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