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SHORT COMMUNICATION

Oral health-related quality of life among survivors of childhood cancer

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Background. Childhood cancer survivors may have experienced a high number of invasive medical and dental procedures, which may affect their oral health-related quality of life (OHRQoL).

Aim. To compare children who have survived cancer and children without cancer with respect to OHRQoL.

Design. In a cross-sectional study, we compared the OHRQoL of children treated for cancer at Aalborg Hospital with the OHRQoL of classmates without cancer. All children answered The Danish version of the Child Perceptions Questionnaire (CPQ). Children aged 8–10 (n = 95) answered $CPQ_{8–10}$, with 27 questions, and children aged 11–14 (n = 138) answered the $CPQ_{11–14}$, with 39 questions.

Results. Children with cancer rated their OHRQoL better or equal to those without cancer. The mean overall $CPQ_{8–10}$ score was 5.6 (95% CI: 2.5–8.6) among 18 children who have survived cancer and 8.8 (95% CI: 7.3–10.3) among those without cancer (n = 77); the mean difference was −3.3 (95% CI: −6.5 to 0.1). The overall mean $CPQ_{11–14}$ score was 12.5 (95% CI: 6.8–18.2) among 24 children who have survived cancer and 11.8 (95% CI: 10.3–13.3) among those without cancer (n = 114); the mean difference was −0.7 (95% CI: −4.9 to 6.3).

Conclusion. Cancer and cancer treatment during childhood was not associated with a decreased OHRQoL.

The annual incidence of childhood cancer in the Western countries is increasing, although survival after childhood cancer has improved[1]. The improved survival is accompanied by concerns regarding long-term health consequences of childhood cancer and cancer treatment[2]. Known adverse effects of cancer and cancer therapy on oral health are mineralization disorders, impaired salivary secretion, and dental caries[3–5]. Childhood cancer survivors may have experienced a high number of invasive medical and dental procedures, which may affect their oral health-related quality of life (OHRQoL). OHRQoL reflects the patient's perception of whether their current oral health status has an impact upon their current quality of life.

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As the association between cancer treatment in childhood and the OHRQoL has never been examined, we decided to conduct a study to compare children who have survived cancer and children without cancer with respect to their OHRQoL. We have previously reported a cross-sectional study on dental anxiety among 51 6- to 14-year-old survivors of childhood cancer[6]. For this study, we collected data on OHRQoL for 42 of these children aged 8–14. As described previously, these children were in remission after cancer treatment at the Oncology Section, Department of Pediatrics, Aalborg Hospital, Denmark. The unit diagnoses 15–20 children with cancer each year. All children of appropriate age in the follow-up clinic were invited to participate if they had received chemotherapy, remained in remission, and had no cognitive difficulties preventing understanding of a questionnaire; none declined. The children had been diagnosed with leukaemia (21),

Table 1. Mean child perceptions questionnaire (CPQ) scores (with 95% CI) among 8–10-year-old, and 11–14-year-old children survivors of cancer and children without cancer.

		With cancer (n = 18)	Without cancer (n = 77)	Mean difference (95% CI)
8–10-year-old children	Total CPQ-score	5.6 (2.5 to 8.6)	8.8 (7.4 to 10.3)	−3.3 (−6.5 to 0.1)
	Sub-scores			
	Symptom	3.6 (1.9 to 5.2)	4.8 (4.1 to 5.4)	−1.2 (−2.9 to 0.5)
	Function	1.0 (0.3 to 1.7)	1.8 (1.4 to 2.3)	−0.8 (−1.6 to 0.0)
	Emotion	0.6 (0.0 to 1.1)	1.3 (1.0 to 1.7)	−0.8 (−1.4 to 0.1)
	Social	0.4 (0.0 to 0.9)	0.9 (0.6 to 1.2)	−0.5 (−1.0 to 0.0)
		With cancer (n = 24)	Without cancer (n = 114)	
11–14-year-old children	Total CPQ-score	12.5 (6.8 to 18.2)	11.8 (10.3 to 13.3)	0.7 (−4.9 to 6.3)
	Sub-scores			
	Symptom	4.9 (3.8 to 6.1)	4.4 (3.9 to 4.8)	0.6 (−0.6 to 1.7)
	Function	2.0 (0.9 to 3.0)	2.3 (1.8 to 2.8)	−0.3 (−1.4 to 0.8)
	Emotion	3.7 (0.7 to 6.7)	3.7 (2.9 to 4.5)	0.0 (−2.9 to 2.9)
	Social	1.9 (0.3 to 3.6)	1.5 (1.1 to 1.8)	0.5 (−1.1 to 2.1)

lymphoma (6), Wilms tumour (9), CNS-tumour (2) or other tumours (3). Mean age at diagnosis was 4.9, and average follow-up since diagnosis was 6.2 years. Six had received radiotherapy in addition to chemotherapy, and three of these children had received radiation to a cranial field of radiation. For comparison, we collected data on OHRQoL on the same children who served as controls in our previous study[6]. Briefly, for logistic reasons, all classmates to seven of the children with cancer (a total of 191 children) were included as controls; the school classes were selected to cover different grades in communities of different sizes distributed throughout the region of uptake. As no data were available on OHRQoL in Danish children prior to our study, formal power calculations were not possible. Instead, we included more than four times as many children without cancer as cancer survivors.

The Danish Data Protection Agency approved the study (record No.: 2004-41-4280). The children answered the validated Danish version of the Child Perceptions Questionnaire (CPQ)[7]. The CPQ includes four domain subscales of oral symptoms, functional limitations, emotional well-being and social well-being. The domain scores and the total CPQ score were calculated by adding the item scores. Children aged 8–10 (n = 95) answered $CPQ_{8–10}$, consisting of 27 questions, and children aged 11–14 (n = 138) answered the $CPQ_{11–14}$, consisting of 39 questions. The total scores range between 0 and 100 ($CPQ_{8–10}$), and between 0 and 148 ($CPQ_{11–14}$) with a high score indicating decreased OHRQoL. We calculated differences (with 95% confidence intervals) between mean CPQ scores in children with and without cancer. Data were analysed using STATA software, version 9.0 (StataCorp, College Station, TX, USA).

Children aged 8–10 with cancer rated their OHRQoL to be better (lower scores) than those without cancer both for total $CPQ_{8–10}$ score [mean difference: 3.3 (95% CI: −6.5 to 0.1)], and for the four subscores: No difference was found among children aged 11 to 14, neither in total $CPQ_{11–14}$ [mean difference: 0.7 (95% CI: −4.9 to 6.3)], nor in any of the four subscores (Table 1).

The Danish CPQ has demonstrated ability to differ between children with known differences in dental health[7], and we therefore consider it to be able to identify potential differences between children with cancer and children without. We used self-reported information on OHRQoL which requires that the included children are able to read and understand the questionnaire. This may have caused selection bias if those excluded differed from the children with cancer with regard to OHRQoL. Another possible limitation in this study is the limited study size. To overcome the fact that no data on OHRQoL were available to allow us to perform formal

power calculations, and as the number of cancer survivors was fixed, we included a relatively large number of controls and all possible individuals with cancer treated at Aalborg Hospital between the ages of 8 and 14, irrespective of time since last treatment. It is possible, that larger studies may result in different results, but it should be noted, that at least 8- to 10-year-old cancer survivors reported better OHRQoL (higher scores) than the controls. As all children were in remission of cancer, we have considered the time since cancer treatment to be of less importance. It is possible, however, that children who have only recently completed treatment would report more treatment-related impacts on OHRQoL than those who received their treatment a number of years ago. This question should be addressed in future studies. Due to the cross-sectional design, we had no information on whether the cancer treatment preceded the level of OHRQoL. Further studies based on larger samples and using a longitudinal design are needed. We cannot explain why the 8–10-year-olds with cancer seem to have a better OHRQoL compared with those without cancer. Children who are long-term survivors after cancer treatment and are diagnosed with salivary dysfunction seldom complain of xerostomia. This may be because they have never experienced a situation with normal flow and therefore accept their situation[8]. A common recommendation in Public Danish Dental Service is that children below the age of ten should receive adult help with tooth brushing and parents to children with cancer may comply better with this advice. Another possible explanation is that cancer treatment may have increased the pain threshold and coping abilities of any oral health limitations after cancer treatment. We conclude that this study could not demonstrate any association between cancer and cancer treatment during childhood and decreased OHRQoL. Further studies based on larger samples and using a longitudinal design are needed. Such studies should also include recording of the dental status of child cancer survivors in order to elucidate the relationship between clinical variables and OHRQoL.

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