

# Oral health-related quality of life in Brazilian children, adolescents, and young adults undergoing cancer treatment

## ABSTRACT

**Introduction:** Cancer is considered a major public health problem worldwide and may have an important impact on oral health-related quality of life (OHRQoL). Thus, the present study aimed to assess OHRQoL in Brazilian patients aged 3 to 21 years undergoing cancer treatment.

**Materials and Methods:** In total, 121 patients receiving cancer treatment and 363 healthy individuals (control group) were evaluated. OHRQoL was assessed using an age-specific questionnaire, that is, the Brazilian versions of the Early Childhood Oral Health Impact Scale (ECOHIS), the Child Perceptions Questionnaire (CPQ) 11–14-short version, the CPQ 8–10-short version, and the short-form of Oral Health Impact Profile Questionnaire-14 (OHIP-14).

**Results:** Individuals from the control group who were evaluated by the ECOHIS presented more impact on the OHRQoL regarding the psychological and family function score, as well as those evaluated by CPQ 8–10, who presented more impact in general. However, considering CPQ 11–14, cancer patients had their OHRQoL more affected, as shown in both the total questionnaire score and oral symptoms score.

**Conclusion:** Within the limitations of this Brazilian study, cancer treatment seems to be associated with decreased OHRQoL only in patients aged between 11 and 14 years. However, children without cancer aged between 8 and 10 years seem to experience worse OHRQoL.

**Keywords:** Adolescent, child, oral health, quality of life, young adults

## INTRODUCTION

Cancer is considered a major public health problem worldwide.<sup>[1]</sup> Recently, increasing incidence and mortality rates have been noted, as well as a transition of the main types of cancer in developing countries due to the aging and growth of the population and changes in the distribution and prevalence of the main risk factors.<sup>[2]</sup> In 2018, the latest world survey estimated 18 million new cases of cancer and 9.6 million related deaths. In Brazil, the estimate for each year of the 2020–2022 triennium indicates 625,000 new cases of cancer and, considering only infant–juvenile individuals, 4,310 new cases in males and 4,150 in females.<sup>[3]</sup>

Modern medicine has been directed not only toward the cure and survival of the patients but also their

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well-being;<sup>[4]</sup> however, chronic diseases such as cancer may have an important impact on quality of life.<sup>[5]</sup> Despite all the recent advances in cancer treatment, patients still experience negative effects in physical, emotional, and social domains.<sup>[4]</sup>

Health-related quality of life represents a subjective measurement of health status, generally achieved by generic or disease-specific questionnaires, which may provide valuable information regarding many aspects of patient life.<sup>[6]</sup> Likewise, oral health-related quality of life (OHRQoL) is based on the individuals' perception of how oral health impacts their quality of life.<sup>[7]</sup>

Despite numerous studies addressing quality of life in cancer patients of varied ages<sup>[8]</sup> and OHRQoL in adults with oral cancer,<sup>[5]</sup> very few have investigated OHRQoL, especially in childhood cancer.<sup>[7]</sup> Thus, the present study aims to assess OHRQoL in patients younger than 21 years undergoing cancer treatment.

## MATERIALS AND METHODS

### Patients and eligibility criteria

All patients receiving radiotherapy and chemotherapy for cancer in the first semester of 2012 in the Hospital or the parents of children under the age of 18 years, were invited to participate in this research. They received information on the study purpose and procures at the first dental appointment, and those that agreed to participate signed informed consent on the subsequent dental appointment, approximately a week later.

As the Hospital is a cancer center that offers treatment for patients aged up to 21 years, the exclusion criteria included children younger than 3 years due to the minimum age required to be assessed by a questionnaire.<sup>[9]</sup> Likewise, patients with congenital facial deformities, facial tumors, or any syndrome were excluded, to prevent sampling bias (confounding effects of these variables on self-perception and quality of life).<sup>[10]</sup>

A control group with healthy individuals was selected randomly from city public schools (Rio Grande do Sul, Brazil), matching three controls to each study participant. The patients were matched for gender and age because of differences in self-perception among the individuals.<sup>[11]</sup> All of them, or the parents of children under the age of 18 years, were invited to participate in this research either by mail or in person. They also received information on the study's purpose and procures, and, those who agreed to participate signed an informed consent a week later.

### Data collection

Data were collected using socioeconomic questionnaires and age-specific quality-of-life questionnaires. Firstly, a structured questionnaire was used to collect socioeconomic variables. Race/skin color was recorded using a criterion developed by the authors according to a Brazilian government classification.<sup>[12]</sup> This characteristic was self-assessed by the respondent of the questionnaire and then dichotomized as "White" or "non-White." Educational level compared fathers and mothers who had completed 8 years of formal instruction, which in Brazil corresponds to primary school, with those who had not. Household income was measured considering the Brazilian minimum wage, which corresponded to approximately \$300 USA dollars per month during the period of data gathering (2012). The occupational status of the parents was classified as employed or unemployed.

Following, OHRQoL was assessed by age-specific questionnaires: The Brazilian versions of the Early Childhood Oral Health Impact Scale (ECOHIS),<sup>[9]</sup> the Child Perceptions Questionnaire (CPQ) 8–10-short version,<sup>[13]</sup> the CPQ 11–14-short version,<sup>[14]</sup> and the short-form of Oral Health Impact Profile Questionnaire-14 (OHIP-14)<sup>[15]</sup> were applied in a face-to-face interview in a quiet room to preserve the study participants' individuality.

The ECOHIS is a proxy-rating questionnaire developed originally to evaluate the impact of oral health problems and related treatment on the quality of life of preschool children (aged 3 to 7 years) and their families.<sup>[9,16,17]</sup> It consists of 13 items, including a child impact section (symptoms, function, psychological, and self-image/social interaction domains) and a family impact section (parent distress and family function domains). Answers were recorded using a Likert scale with response options coded from 0 to 5 (0 = never; 1 = hardly ever; 2 = occasionally; 3 = often; 4 = very often; 5 = do not know). The ECOHIS scores were computed by summing scores for each domain after recoding all "do not know" responses as missing. For those with up to two missing responses in the child section or one missing response in the family section, a score for the missing items was imputed as an average of the remaining items for that section.<sup>[17]</sup> Higher scores denote a greater impact of oral conditions on a child's quality of life. The questionnaire was completed by parents.

The short version of CPQ 8–10 is intended for children aged 8–10 years. It comprises 25 items divided into four subscales: oral symptoms (5 items), functional limitations (5 items), well-being (5 items), and social welfare (10 items).<sup>[13]</sup> The short version of CPQ 11–14 was used for patients between

11 and 14 years. It consists of 16 questions covering four domains: oral symptoms (4 questions), functional limitations (4 questions), emotional well-being (4 questions), and social well-being (4 questions).<sup>[14]</sup> Individuals older than 15 years completed the short form of OHIP-14. It presents 14 questions, two for each of the seven dimensions of the instrument: functional limitations, physical pain, psychological discomfort, physical disability, psychological disability, social disability, and handicap.<sup>[15]</sup>

For the CPQ 8–10, CPQ 11–14, and OHIP-14 questionnaires, responses were recorded using a Likert scale as well. Each question shows five options, scaled from 0 to 4, with higher values corresponding to poorer status. Questionnaire scores were computed by summing scores for each domain. Higher scores denote a greater impact of oral conditions on children's quality of life. These questionnaires were completed by the individuals.

### Statistical analyses and ethical issues

Data were analyzed using the STATA 12.0 software (Stata Corp., College Station, TX, USA). Sociodemographic and clinical characteristics of the individuals from each group were compared using the Chi-square test and a *P* value <0.05 was considered statistically significant.

The overall and domain-specific scores of the OHRQoL questionnaires were assessed by using Poisson's regression analysis. This statistical strategy allowed for the estimation of rate ratios (ratio of arithmetic means) and their respective 95% confidence intervals between individuals with and without cancer.

This study was approved by the Research Ethics Committee of the University of Santa Maria (protocol number 23081.017051/2011-84).

## RESULTS

Considering all the individuals initially enrolled in the study, one with head and neck lymphoma and two with syndromes were excluded, totalizing 121 in the cancer group and 363 in the control group. The most prevalent disease in the cancer group was leukemia (66.1%), followed by lymphoma (11.6%), sarcoma (6.7%), Wilms' tumor (4.1%), and others (11.5%).

Table 1 demonstrates the sociodemographic and clinical characteristics of the individuals. In the cancer group, 71 males (58.7%) and 50 females (41.3%) participated in this study and the mean age was 11 years (standard

**Table 1: Sociodemographic and clinical characteristics of the patients**

Variable	Cancer group (n=121)	Control group (n=363)	P
Gender			
Female	50 (41.32%)	150 (41.32%)	∅
Male	71 (58.68%)	213 (58.68%)	
Age			
<7 years	43 (35.54%)	129 (35.54%)	∅
8-10 years	20 (16.53%)	60 (16.53%)	
11-14 years	24 (19.83%)	72 (19.83%)	
>15 years	34 (28.10%)	102 (28.10%)	
Race/skin color			
White	99 (81.82%)	255 (71.43%)	0.024*
Others	22 (18.18%)	102 (28.57%)	
Household income			
≤2 BMW	98 (81.67%)	194 (59.51%)	<0.000*
>2 BMW	22 (18.33%)	132 (40.49%)	
Mother's educational level			
≤8 years	76 (66.09%)	175 (49.02%)	<0.001*
>8 years	39 (33.91%)	182 (50.98%)	
Father's educational level			
≤8 years	73 (69.52%)	168 (51.38%)	<0.001*
>8 years	32 (30.48%)	159 (48.62%)	
Mother's occupation status			
Employed	48 (40.00%)	194 (62.18%)	<0.000*
Unemployed	72 (60.00%)	118 (37.82%)	
Father's occupation			
Employed	89 (79.46%)	277 (92.03%)	<0.000*
Unemployed	23 (20.54%)	24 (7.97%)	

<sup>∅</sup>Groups were matched for gender and age (1:3); \*Statistical significance using a Chi-square test. BMW: Brazilian minimum wage (approximately US\$300 during the year 2012)

deviation, 5.3 years). Both groups comprised predominantly White individuals (81.8% in the cancer group and 71.4% in the control group) but with a difference in proportions. Most mothers in the cancer group had a low educational level (66%). In both groups, most fathers had a low educational level; however, a difference in the proportions was observed. Most mothers in the cancer group were unemployed (60%). The household income in both groups was equal to or lower than two minimum wages but also with a difference in proportions.

Table 2 presents the total and domain scores of ECOHIS, CPQ 8–10, CPQ 11–14, and OHIP-14 submitted to Poisson's regression analysis. The individuals from the control group who were evaluated using the ECOHIS presented more impact on the OHRQoL only considering the psychological and family function scores, as well as those evaluated using CPQ 8–10 who presented more impact in general. However, with regards to CPQ 11–14, the patients from the cancer group had their OHRQoL more affected, as shown in both the total questionnaire score and oral symptoms scores.

**Table 2: ECOHIS, CPQ 8-10, CPQ 11-14, and OHIP-14 scores**

Questionnaire and domains	Group		RR (95% CI)
	Cancer (mean, SD)	Control (mean, SD)	
ECOHIS	3.93 (4.40)	3.53 (5.03)	1.11 (0.73-1.68)
Symptoms	1.81 (1.00)	1.68 (0.92)	1.08 (0.89-1.30)
Function	1.60 (1.47)	2.16 (1.82)	0.74 (0.54-1.01)
Psychological	1.23 (0.61)	1.63 (1.25)	0.75 (0.62-0.92)*
Self-image/social interaction	1.09 (0.42)	1.24 (0.80)	0.87 (0.75-1.03)
Parent distress	1.67 (1.50)	1.95 (1.55)	0.86 (0.63-1.16)
Family function	1.17 (0.44)	1.36 (0.95)	0.81 (0.69-0.97)*
CPQ 8-10	18.35 (5.25)	18.53 (13.4)	0.45 (0.32-0.62)*
Oral symptoms	10.85 (5.98)	12.43 (7.60)	0.87 (0.66-1.16)
Functional limitation	3.6 (3.70)	3.36 (3.42)	1.07 (0.64-1.78)
Emotional well-being	4.3 (2.92)	4.23 (3.37)	1.01 (0.71-1.45)
Social well-being	2.95 (2.30)	2.36 (2.14)	1.25 (0.83-1.87)
CPQ 11-14	13.70 (8.22)	10.02 (8.3)	1.37 (1.01-1.85)*
Oral symptoms	6.73 (2.93)	6.35 (2.79)	1.06 (1.01-1.85)*
Functional limitation	3.91 (2.31)	3.78 (2.62)	1.03 (0.77-1.38)
Emotional well-being	4.68 (4.05)	5.23 (4.09)	0.89 (0.60-1.33)
Social well-being	2.68 (2.40)	3.17 (2.47)	0.84 (0.56-1.27)
OHIP-14	6.94 (4.79)	6.77 (6.32)	1.02 (0.76-1.37)
Functional limitation	1.71 (1.27)	1.33 (0.86)	1.28 (0.97-1.68)
Physical pain	2.57 (2.00)	2.50 (1.61)	1.02 (0.77-1.36)
Psychological discomfort	3.4 (1.96)	3.26 (2.01)	1.04 (0.83-1.30)
Physical disability	1.71 (1.23)	1.70 (1.27)	1.01 (0.76-1.33)
Psychological disability	1.88 (1.37)	1.90 (1.29)	0.99 (0.75-1.30)
Social disability	1.51 (1.12)	1.63 (1.10)	0.93 (0.70-1.22)
Handicap	1.23 (0.81)	1.35 (1.02)	0.91 (0.70-1.18)

\*Statistical significance using the Poisson regression analysis (95% confidence intervals). SD: Standard deviation; CI: confidence interval; RR: unadjusted rate ratio (ratio of arithmetic means)

## DISCUSSION

Although some studies with adults undergoing oral and oropharyngeal cancer treatment have shown negative effects on OHRQoL and an association between long-term OHRQoL and health-related quality of life,<sup>[5,6,18]</sup> very few are available concerning children and adolescents worldwide.<sup>[7]</sup> The current study evaluated OHRQoL in Brazilian patients undergoing cancer treatment and showed that those aged between 11 and 14 years reported worse scores, in general, and in the oral symptoms domain.

To the best of the authors' knowledge, there is no other similar study on OHRQoL in cancer children younger than 7 years. Given that two ECOHIS domains (psychological and family function) showed higher scores in the controls, the authors believe that the parents probably considered oral health conditions as something of secondary importance, that is, the oncological treatment was the focus at that moment. Similarly, for children aged 8–10 years, a study found no difference in OHRQoL between those with and without cancer.<sup>[7]</sup> This fact may be explained by the support

provided by the cancer center, where recreational activities are held weekly and dental care is largely available, resulting in better self-perception of oral health.

The study previously mentioned also showed no difference in OHRQoL between children aged 11–14 years with and without cancer.<sup>[7]</sup> The current data, however, demonstrated that these children presented a higher impact on general OHRQoL, as well as on the oral symptoms domain. It is in agreement with the study hypothesis, in which the authors expected to find a marked association between cancer treatment and decreased OHRQoL because of the well-known acute and chronic oral complications of oncology treatment such as caries, gingivitis, oral infections, and oral mucositis.<sup>[19]</sup>

Despite being encouraging, the results of the present study should be interpreted with caution mainly because of sample discrepancy. Even recruiting age- and gender-matched controls, demographic and social characteristics of the individuals of each group presented some differences, which could, unfortunately, lead to sample bias. Another possible study limitation is related to the tumor features and oncological treatment, which varied considerably within the sample.

As the use of OHRQoL questionnaires should rely on previous cross-cultural adaptation and validation for specific groups (e.g., Brazilian children within a certain age group), it is very difficult to extrapolate around the world the subject herein addressed. Furthermore, there are so little relevant data available on the OHRQoL of children receiving cancer treatment (especially Brazilians) that realistic comparisons and a deeper discussion concerning the present findings cannot be easily made.

## CONCLUSION

Within the limitations of this Brazilian study, cancer treatment seems to be associated with decreased OHRQoL only in patients aged between 11 and 14 years; however, children without cancer aged between 8 and 10 years seem to experience worse OHRQoL. Further studies with larger samples are then suggested to confirm these findings not only in Brazilians but also in other populations.

## Ethics approval

Ethical Clearance was obtained from the Institutional Ethical Committee of the University of Santa Maria with Ref no 23081.017051/2011-84 dated 05.01.2012.

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Nil.

**Conflicts of interest**

There are no conflicts of interest.

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