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Malocclusion, tooth decay and gingivitis as factors associated with the shame of smiles in oncology pediatric patients

Má oclusão, cárie dentária e gengivite como fatores associados à vergonha de sorrir em pacientes pediátricos oncológicos

Mala oclusión, caries dentales y gingivitis como factores asociados a la verguenza de sonreír en pacientes pediátricos oncológicos

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The study aimed at explaining the "shame to smile" in oncologic pediatric patients, considering variables related to malocclusion, tooth decay and periodontal disease. This is a cross-sectional research, conducted in a reference hospital in the state of Paraíba, Brazil. The sample was taken by convenience, and composed of 52 patients aged 12 and from 15 to 19 years old. Two forms were used as data collection instruments (clinical exam and interview), both from the program Saúde Bucal Brasil 2010. The research was conducted between 2011 and 2014. Data were analyzed through the software R (version 3.1.1), using descriptive and inferential statistical techniques. In the descriptive analysis, absolute and percentile values, as well as central tendency and dispersion measures were used. In the inferential analysis, through the logistic binary regression, the significant variables to explain the inhibition of smiling presented by the patients of the study could be identified. Risk factors for such an inhibition were: maxillary misalignment (OR-6.59), altered molar relation (OR=9.16), number of teeth with cavities (OR=1.71) and the presence of gingival bleeding (OR=15.88). Malocclusion, tooth decay and gingivitis are factors associated to smile inhibition in pediatric oncological patients.
Descriptors: Neoplasms; Pediatric dentistry; Dental occlusion; Malocclusion; Dental caries; Periodontics.

O estudo teve o objetivo de explicar a "inibição de sorrir" em pacientes oncológicos pediátricos a partir de variáveis relacionadas à má oclusão, cárie e doença periodontal. Esta é uma pesquisa transversal realizada em um hospital de referência no estado da Paraíba, sendo a amostragem feita por conveniência, composta por 52 pacientes com idades de 12 anos e 15 a 19 anos. Utilizaram-se como instrumentos de coleta duas fichas (exame clínico e entrevista) do levantamento Saúde Bucal Brasil 2010. A pesquisa foi realizada entre anos de 2011 a 2014. Os dados foram analisados no software R (versão 3.1.1), recorrendo a técnicas estatísticas descritivas e inferenciais. Na análise descritiva, utilizaram-se valores absolutos e percentuais e medidas de tendência central e dispersão. Na análise inferencial, por intermédio da regressão logística binária, se identificou as variáveis significantes para explicar a inibição ao sorrir dos pacientes do estudo. Observou-se como fatores de risco para a inibição ao sorrir, ter desalinhamento maxilar (OR=6,59), relação molar alterada (OR=9,16), número de dentes cariados (OR=1,71), e presença de sangramento gengival (OR=15,88). A má oclusão, cárie dentária e gengivite são fatores associados à vergonha de sorrir nos pacientes pediátricos oncológicos.
Descritores: Neoplasias; Odontopediatria; Oclusão dentária; Má oclusão; Cárie dentária; Periodontia.

El estudio tuvo el objetivo de explicar la "inhibición de sonreír" en pacientes oncológicos pediátricos a partir de variables relacionadas a la mala oclusión, caries y enfermedad periodontal. Esta es una investigación transversal realizada en un hospital de referencia en el Estado de Paraíba, Brasil, siendo el muestreo hecho por conveniencia, compuesta por 52 pacientes con edades de 12, 15 y 19 años. Se utilizaron como instrumentos de colecta dos fichas (examen clínico y entrevista) de la revisión Salud Bucal Brasil 2010. La investigación fue realizada entre los años de 2011 a 2014. Los datos fueron analizados en el software R (versión 3.1.1), utilizando técnicas estadísticas descriptivas e inferenciales. En el análisis descriptivo, se emplearon valores absolutos y porcentajes y medidas de tendencia central y dispersión. En el análisis inferencial, por intermedio de la regresión logística binaria, se identificaron las variables significantes para explicar la inhibición al sonreír de los pacientes del estudio. Se observó como factores de riesgo para la inhibición al sonreír, tener desalineación maxilar (OR=6,59), relación molar alterada (OR=9,16), número de dientes cariados (OR=1,71), y presencia de sangramiento gengival (OR=15,88). La mala oclusión, caries dentales y gingivitis son factores asociados a la vergüenza de sonreír en los pacientes pediátricos oncológicos.
Descriptores: Neoplasias; Odontología pediátrica; Oclusión dental; Maloclusión; Caries dental; Periodoncia.

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INTRODUCTION

Aesthetic perception varies from person to person. Children and adolescents feel its effects more strongly because of their social environment - schools and universities - and of their personal and loving relationships. They also have little personal experience, and their thoughts are routinely modified and influenced. Thus, actions to control the changes in buccal appearances have been being the target of investigations, which are based in several oral health indexes recommended by the World Health Organization (WHO) in an attempt to minimize their psychological consequences in children and teenagers, having as an starting point the knowledge regarding the risk factors for the development of buccal infirmities and tooth and bone deformities[1].

Malocclusions, diseases connected to the periodontium, lack of development and enamel mineralization, cavities, anodontia, and precocious loss of dental elements, are the main factors which determine the primary perception that one does not fit into the beauty stereotypes imposed by our society; beyond the functional problems, the psychological aspect is also influenced, and consequently, so are the social insertion and interaction of those who are affected by them[2].

Systemic pathological factors, such as neoplasms, syndromes and aggressive incurable diseases, characterize patients whose profile shows a self-perception of oral health modified by the presence of many simultaneous changes in their corporal and oral states. The loss of body weight, hair, changes in the routines and way of life, are events that negatively influence the self-esteem of this group of patients[3]. Difficulties in the perception of their own physical appearance, alopecia and weight loss are visual signs for other people, which indicate that something out of the ordinary is happening[4].

In this perspective, the smile is also evaluated when it comes to appearance, leading the patient to feel inhibited to smile, if their smile is not within beauty standards, and that is a factor which contributes for a diminishing in the quality of life of the individual[5]. Finding out which are the factors related to the smile inhibition of oncological pediatric patients can provide the basis for preventive strategies with potential to mitigate such a feeling among this population.

Considering the lack of studies in literature which discuss this theme, this research aims at explaining the "inhibition of smiling" in oncological pediatric patients, taking into account variables related to malocclusion, dental cavities, and periodontium diseases.

METHOD

This study was approved by the Committee of Research Ethics in studies involving human beings of the University Hospital Lauro Wanderley - CEP/HUWL, at the Paraíba Federal University, under the protocol nº 259/11, sheet number 4200 64, on April 26, 2011.

This is an observational, cross-sectional, analytical study, of a descriptive and inferential nature, which uses a quantitative approach.

The population of the study was comprised by all oncological patients in the pediatric ward of the Hospital Napoleão Laureano, a reference for the treatment of cancer in the city of João Pessoa, state of Paraíba.

The sample was chosen by convenience, and the inclusion criteria were: children and adolescents being cared for in the above mentioned Hospital, both male and female, 12 year olds and others in the age group from 15 to 19 years of age (which is the age group considered by the epidemiological national survey "Saúde Bucal Brasil" (Brazil Oral Health) - 2010, which aimed to assess the existence of malocclusion in permanent dentition), afflicted by malignant neoplasms, under oncological treatment in any of its many stages, including patients which were already in control of their disease, that is, who had finished their treatment, but who were undergoing routine consultations in the period of data collection, which went from 2011 to 2014.

Were excluded from the sample: patients who, whatever their age may be, did not allow for the examination to be performed, and patients who did not sign the Free Consent Form, including both those under 18 years of age whose tutors did not agree with their participation and those who were 18 years of age or older, and did not want to participate.

The intensive direct observation technique was used, as well as a structured questionnaire to record the clinical examinations and interviews. The volunteers of the research were approached as they were waiting to be attended for consultations with the physician.

The instrument employed for oral clinical examination was the same one used for the national epidemiological survey[6], and information regarding dental cavities, periodontium conditions and occlusion conditions was obtained.

Clinical examinations were conducted in the dental office in the pediatric ward of the Hospital, by duly trained and calibrated examiners, from the criteria established by the national survey[7]. The kappa index (k) was above recommended levels (k>0.65). Clinical games standardized by the World Health Organization were used: a buccal mirror and the WHO periodontal probe, both adequately sterilized, according to the biosafety standards of the Health Ministry.

Data relative to the variable "embarassment to smile" were collected through a questionnaire applied in the national epidemiological survey[6], which evaluated, among other aspects, the patients self-perception and the impacts of oral health.

Data were analyzed through the software R, version 3.1.1 (www.r-project.org). Data analysis were conducted through the use of descriptive and inferential statistics.

Considering descriptive statistics, absolute values and percentages were used, and for some numerical variables, central tendency and dispersion measures were also used. Regarding inferential methods, binary logistic regression was used as a model to support decision making, in order to identify the set of significant values and explain why the patients of the study were embarrassed to smile.

Initially, a significance level of 30% in bivariate analysis was selected, as to perform a pre-selection of the variables which were part of the logistic regression model. After this step, the pre-selected variables were evaluated in the logistic regression model with a significance level of 10%. The dependent variable of the study was "embarrassment to smile in the last 6 months".

The independent variables were those collected from a clinical exam of the oral cavity (cavities, occlusion, gingival bleeding, calculus) and the interview (sample characterization, oral health impacts). Cf. variables used in Table 1.

Table 1. Variable categorization, João Pessoa/PB, 2014.

Variable	Categorization
Age	Numerical
Gender	1-Male 2-female
Color	1 - White 2 - Black 3 - Yellow 4 - Brown 5 - Native
Embarrassed to smile	1 - Yes 0 - No
Crowding	1 - Crowding in one of the segments or both. 0 - No crowding
Spacing	1 - Spacing in one of the segments or both. 0 - No spacing
Diastema	Numerical
Maxillary misalignment	1 - Present (≥ 1 mm) 0 - Absent
Mandible misalignment	1 - Present (≥ 1 mm) 0 - Absent
Retrognathism	Numerical
Prognathism	Numerical
Open bite	Numerical
Molar relation	1 - Altered (Class II or Class III) 0 - Unaltered (Class I)
DMFT, D, M, F	Numerical
Bleeding	1 - Present 0 - Absent
Calculus	1 - Present 0 - Absent

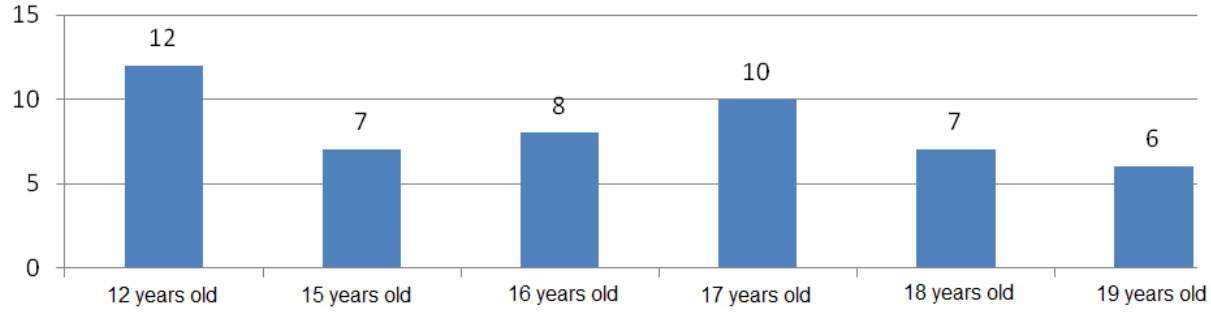
RESULTS

The age of the participants varied between 12 and 19 years of age, with an average of 15.6 and standard deviation of 2.5. Graph 1 shows the distribution of age in the selected sample.

Regarding their gender, 32 (61.5%) of patients were male, while 20 (38.5%) were female. Considering the skin color, which was declared by the patients themselves, 18 (34.6%) were white, 4 (7.7%) black, and 30 (57.7%) brown. No participant declared themselves to be natives or yellow.

The embarassment to smile in the last six months, variable which was the aim of this study, was reported by 14 patients (26.9%), being that 3 of them (21.4%) were 12 years old and 11 (28.9%) were between 15 and 19 years old.

Graph 1. Frequency age distribution (in years) of oncological pediatric patients, João Pessoa/PB, Brazil, 2014.



The DMFT average of the 12 year olds were 4.0, with a standard deviation of 3.5. 2 (21.4%) patients did not have cavities. In the age group from 15 to 19 years of age, DMFT average was 5.5, standard deviation 3.1 and 4 (10.5%) did not present cavities. Untreated cavities were found in 34 (65.4%) patients. Other data regarding DMFT are in Table 1.

Table 1. Distribution of the frequency of DMFT values of oncological pediatric patients, João Pessoa/PB, Brazil, 2014.

	DMFT	Decayed component	Missing component	Filled teeth
Average	5.1	2.7	0.4	2.1
Standard deviation	3.3	3.0	0.8	2.7
Minimum	0	0	0	0
Maximum	11	10.0	4	11

Regarding occlusion conditions, the greatest diastema found had 2 millimeters. The greatest maxillary misalignment was 5 millimiters, and the greatest mandible misalignment was 3 millimiters. No patient presented retrognathism, and only 1 (1.92%) presented overbite. As to the variable "spacing", 39 (75.0%) did not present it, whereas 9 (17.3%) had it in one segment, and 4 (7.7%) in both. When it comes to "crowding", 35 (67.3%) did not present croding, 12 (23.1%) presented it in one segment, and 5 (9.6%) in both.

Regular molar relation, that is, the situation in which the mesiobuccal cusp of the first molar occludes the mesiobuccal groove of the inferior molar, was found in 25 (48.1%) participants. 16 (30.8%) of patients presented a half cusp relation, and 11 (21.1%) an entire cusp relation. Half cusp molar relation happens when the first inferior molar is half a cusp to the mesial or distal side in relation to the normal position. The entire cusp molar relation happens when the same molar is one entire cusp to the mesial or distal sides. Both sides are

evaluated and the worst condition is registered.

Anterior misalignment was evaluated in the 4 anterior incisors in both arcs, measured in millimeters with the WHO probe. The maxillary misalignment has varied from 0 to 5 millimeters, 35 (67.3%) patients did not present maxillary misalignment and 17 (32.7%) presented some degree of misalignment above 1 millimeter. Mandible misalignment varied from 0 to 3, and 38 (73.1%) patients did not present maxillary misalignment above 1 millimeter, while 14 (26.9%) did.

The gingival bleeding were present in 27 (51.9%) patients, while 25 (48.1%) did not. When it comes to calculus, 26 (50%) patients presented it, against 26 (50%) who did not. Considering their ages, 5 (35.7%) among the 12 year old patients presented calculus, and the same number presented gingival bleeding. Among the patients between 15 and 19, 21 (55.3%) presented calculus, and 23 (60.5%) bleeding.

As a means to select variables to compose the binary logistic regression, a bivariate analysis was at first conducted. Thus, the level of association among each independent variable was assessed, considering them and the objective: the "embarrassment to smile". The variables associated to the objective of the study, considering a significance level (α) of 30%, were pre-selected to create a regression model, and are described in Table 2.

Table 2. Bivariate analysis. João Pessoa/PB, Brazil, 2014.

Variable	p-value
Crowding	0.01
Spacing	0.18
Diastema	0.22
Maxillary misalignment	0.19
Molar relation	p<0,001
DMFT	0.21
Decayed elements	p<0,001
Gingival bleeding	0.11

Regarding the binary logistic model, the variables are statistically meaningful (p-value ≤ 0,10), and can explain the "embarrassment of smiling" in the patients was considered in the final adjusted regression model and are displayed in Table 3, as well as the models coefficient, its standard error, p-value, odds ratio (OR) and confidence interval (CI).

Table 3. Adjusted final model. João Pessoa/PB, 2014.

Variables	Coefficient	Standard error	p-value	OR	IC of the OR (95%)
Maxillary misalignment	1.88	1.03	0.07	6.59	[4.89-8.29]
Altered molar relation	2.21	1.00	0.03	9.16	[7.20-11.12]
Number of elements with cavities	0.54	0.19	p<0,001	1.71	[1.34- 2.08]
Presence of gingival bleeding	2.76	1.26	0.03	15.88	[13.41-18.35]

The deviance function was 35.01, lower than the reference, the chi-square distribution ($\chi 2(0,05, 56)=64,00$), indicating that the model is valid when one considers the general adequacy test. The area under the ROC curve was 0.91 (Image 1), and the contingency matrix, which presents the true and false rates, can be seen in Table 4.

It can be noted that the presence of maxillary misalignment increases 6.59 times the chance that the patient is embarrassed of smiling, and similarly, altered molar relations

increase the chance 9.16 times. The presence of gingival bleeding increases the chances of embarrassment 15.88 times. In addition, each separate element which presents a cavity increases that chance 1.71 times.

Image 1. Area under the ROC curve. João Pessoa/PB, 2014.

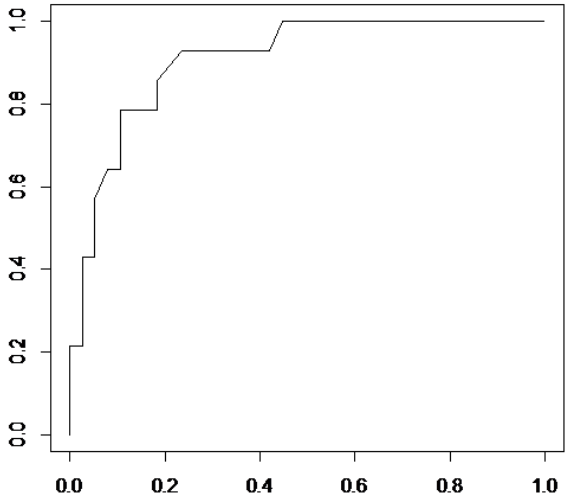


Table 4. Matrix of contingency. João Pessoa/PB, 2014.

Observed values	**Predicted values**		
		Y=0	Y=1
	Y=0	35 (True negative - 92.10%)	3 (False positive - 21.43%)
	Y=1	3 (False negative - 7.90%)	11 (True positive - 8.57%)

DISCUSSION

Most participants in the sample(61.5%) were male. Other studies also suggest that men are more commonly found in samples of patients affected by child cancer[8-11].

The embarrassment of smiling in the last six months was reported by 14 patients (26.9%), being that 3 (21.4%) of them were 12 years old and 11 (28.9%) were in the age group from 15 to 19 years of age. These rates are higher than national data[12], according to which 12.8% of 12 year olds are embarrassed to smile, percentage that applies both to the northeastern region and to the country as a whole. Considering the age group from 15 to 19, the northeastern percentage is 14.6%, and the Brazilian one, 12.9%. These numbers may indicate that the oncologic patients are subject to this feeling more commonly, which may be explained for alack of self esteem due to changes in their appearence brought by cancer itself, and by the aggressive treatment it often demands.

The average DMFT was 4 for 12 year olds, which is higher than the average for the municipality of João Pessoa (2.78), though it is very close to the average found in the Northeast region as a whole (3.84). The average DMFT in the age group from 15 to 19 years of age was 5.5, lower than the average of João Pessoa (6.15); it was also lower than the average from the countryside of the Northeast region12 (6.22).

Still discussing the DMFT, decayed elements were the most common (average of 2.7), when compared to missing (average of 0.4) and filled (average of 2.1) teeth. Another study has also verified that among healthy children and those with cancer, the DMFT presented a higher number of decayed elements[13].

A plan should be created to prevent and control dental decay among oncological pediatric patients, considering that such individuals may present a higher rate of cavities, as they are subjected to hyposalivation and changes in the salivary consistency14, and therefore are prone to develop the disease[14-16].

The bleeding were present for 51.9% of patients, while calculus affected 26 (50%). Considering their ages, 5 (35.7%) among the 12 year old patients presented calculus, and the same number presented gingival

bleeding. Among the patients between 15 and 19, 21 (55.3%) presented calculus, and 23 (60.5%) bleeding. These percentages are higher than the data regarding the prevalence of these diseases in the Northeastern region, which indicated that 26.6% of 12 year olds presented bleeding, and 25.7% calculus. These percentages, in the age group between 15 and 19 year olds, were of 35.2% for the presence of bleeding, and 43.7% for that o calculus in the Northeast region[12].

In accordance with these results, the study conducted by Maciel et al.[17] with children undergoing oncological treatment, found that the levels of gingival bleeding and visible dental plaques were elevated when compared to those of the control group of children non-affected by cancer. Some conditions that affect the health of cancer patients, such as low platelet levels, can lead to gingival bleedings. The oncological treatment diminishes the effects of the immune system of the patient, which coupled with a difficulty to take adequate care of the oral hygiene, makes it common for a preexistent gingivitis to be exacerbated in this situations[18].

The maxillary misalignment were present for 17 (32.7%) patients. The misalignment is related to the four Andrews occlusion key[19], in which the teeth must be free of rotations. Since the superior arc is more evident in a smile, rotations in it are bound to bother patients more.

In this research, when the misalignment of dental elements was present in the superior arc (maxillary misalignment) the chance of embarrassment to smile was 6.59 times greater. Still on occlusion, altered molar relations increased in 9.16 times the chance of embarrassment. Class II or III altered molar relation can indicated discrepancies between bone bases, thereby changing the smile and/or the patients facial profile, leading to their embarrassment of smiling. In another research, an association was found between a dissatisfaction with the appearance of one's teeth and their gingiva and malocclusions; however, unlike the present study, cavities were not associated[20].

The presence of gingival bleeding increased in 15.88 times the chance of a patient being embarrassed to smile, and each decayed element in their oral cavity increased that chance 1.71 times.

In a study conducted by Carneiro[5], the embarrassment to smile showed itself to be a risk factor for the quality of life related to health, according to the statement of the caretaker of the oncological pediatric patient (sample of patients in treatment and who had finished treatment), although, in that study, it was not possible to identify the possible causes for that feeling. In the same study, from the point of view of the caretakers of the patients who finished their treatment, a lot of dissatisfaction with their teeth was a risk factor, and a low difficulty in observing one's own appearance was a protection factor for the same outcome. From the point of view of the patients (sample of patients still in treatment and of those who finished their treatment), a lower difficulty in the perception of their own physical appearance was considered to be a protection factor against the prejudice to their life quality, as it relates to health[5]. The feeling of large dissatisfaction with the teeth may be related to the embarrassment of smiling (both being risk factors that can diminish the quality of life). The dissatisfaction of this population with their teeth, therefore, might stem, mainly, from aesthetic issues, more so than funcional ones. Such a situation is favorable for the individual to have a difficult time perceiving their own physical appearance, a variable which is also significant for their quality of life.

Oncological pediatric patients (from 0 to 19 years of age) are risk group, susceptible to an elevated number of buccal illnesses, both because of the systemic treatment imposed on them and for the change in their social and family life standards[2,21]. They may present a higher number of buccal mucosa infections, cavities and periodontal disease[15,16], which led the choice of patients for this study.

A possible limitation of this research is the relatively small sample size, which is due to the fact that child cancer is a relatively rare

pathology in Brazil, representing only from 2 to 3% of all malignant tumors[22]. That, however, does not prevent valid conclusions from being extracted from the results. In addition, this seems to be the only study ever published in the literature which aimed at explaining the embarrassment of smiling among oncological pediatric patients.

The model chosen was capable of revealing which variables are associated to the embarrassment of smiling among patients with child cancer, and through it, it is possible to identify patients which may present such a feeling. The decision making process of the administrators of the services which care for this population should focus on the integration among the oral health team and the professional multidisciplinary team responsible for oncological treatment. The dental surgeon will act to prevent and diminish oral health illnesses. Finally, the information obtained in this work provide the bases for planing strategies for the dental care of oncological pediatric patients.

CONCLUSION

Maxillary misalignment, altered molar relations, a greater number of decayed elements, and the presence of gingival bleeding were found to be risk factors for the oncological pediatric patient to present the feeling "embarrassment of smiling".

REFERENCES

1. Peres SHCS, Gova S, Cortellazzi KL, Ambrosano GMB, Meneghim MC, Pereira AC. Self-perception and malocclusion and their relation to oral appearance and function. Ciênc Saúde Coletiva. 2011; 16(10):4059-66.
2. Peres KG, Traebert ESA, Marcenes W. Diferenças entre autopercepção e critérios normativos na identificação das oclusopatias. Rev Saúde Pública. 2002; 36(2):230-6.
3. Gomes IP, Lima KDA, Rodrigues LV, Lima RAGD, Collet N. Do diagnóstico à sobrevivência do câncer infantil: perspectiva de crianças. Texto & Contexto Enferm. 2013; 22(3):671-9.
4. Cicogna EC, Nascimento LC, Lima RAG. Children and Adolescents with Cancer: experiences with chemotherapy. Rev Latinoam Enferm. 2010; 18(5):864-72.
5. Carneiro TV. Impacto da saúde bucal, variáveis socioeconômicas e demográficas, tratamentos oncológicos e seus efeitos deletérios sobre a qualidade de vida relacionada à saúde de portadores de câncer infantil. [Dissertação]. João Pessoa: Universidade Federal da Paraíba; 2014.
6. Ministério da Saúde (Br). Secretaria de Vigilância à Saúde. Secretaria de Atenção à Saúde. Projeto SBBrasil2010 - Pesquisa Nacional de Saúde Bucal. Manual da equipe de campo. Brasília: Ministério da Saúde; 2009. 53p.
7. Ministério da Saúde (Br). Secretaria de Vigilância à Saúde. Secretaria de Atenção à Saúde. Projeto SBBrasil2010 - Pesquisa Nacional de Saúde Bucal. Manual de calibração dos examinadores. Brasília, DF: Ministério da Saúde; 2009. 21p.
8. Vries MA, Van Litsenburg RR, Huisman J, Grootenhuis MA, Versluys AB, Kaspers, GJL, et al. Effect of dexamethasone on quality of life in children with acute lymphoblastic leukaemia: a prospective observational study. Health Qual Life Outcomes. 2008; 6(1):103.
9. Lau JT, Yu XN, Chu Y, Shing MM, Wong EM., Leung TF, et al. Validation of the chinese version of the Pediatric Quality of Life Inventory (PedsQL) Cancer Module. J Pediatr Psychol. 2010; 35(1):99-109.
10. Baggott CR, Dodd M, Kennedy C. An evaluation of the factors that affect the health-related quality of life of children following myelosuppressive chemotherapy. Support Care Cancer. 2011; 19(1):353-61.
11. Tsuji N, Kakee N, Ishida Y, Asami K, Tabuchi K, Nakadate H, et al. Validation of the japanese version of the Pediatric Quality of Life Inventory (PedsQL) Cancer Module. Health Qual Life Outcomes. 2011; 9(1):22.
12. Ministério da Saúde (Br). Secretaria de Atenção à Saúde. Secretaria de Vigilância em Saúde. SB Brasil 2010 - Pesquisa Nacional de Saúde Bucal: resultados principais. Brasília, DF: Ministério da Saúde; 2012. 118p.
13. Figueiredo PBA, Nogueira AJS. Prevalência de neoplasias, cárie e gengivite em pacientes oncológicos pediátricos no município de Belém, Pará. Pesqui Bras Odontopediatria Clín Integr. 2013; 13(2):141-6.
14. Hutton A, Bradwell M, English M, Chapple I. The oral health needs of children after treatment for a solid tumour or lymphoma. Int J Paediatr Dent. 2010; 20(1):15-23.
15. Lima AAS, Figueiredo MAS, Krapf SMR, Souza FR. Velocidade do fluxo e pH salivar após radioterapia da região de cabeça e pescoço. Rev Bras Cancerol. 2004; 50(4):287-93.
16. Feio M, Sapeta P. Xerostomia em cuidados paliativos. Acta Med Port. 2005; 18(1):459-66.

17. Maciel JCC, Castro CG, Brunetto AL, Di Leone LP, Silveira HED. Oral health and dental anomalies in patients treated for leukemia in childhood and adolescence. Pediatr Blood Câncer. 2009; 53(3):361-5.
18. Barbosa AM, Ribeiro DM, Caldo-Teixeira AS. Conhecimentos e práticas em saúde bucal com crianças hospitalizadas com câncer. Ciênc Saúde Coletiva. 2010; 15:1113-22.
19. Andrews LF. The six keys to normal occlusion. Am J Orthod. 1972; 62(3):296-309.
20. Borges CM, Peres MA, Peres KG. Associação entre presença de oclusopatias e insatisfação com a aparência dos dentes e gengivas: estudo com adolescentes brasileiros. Rev Bras Epidemiol. 2010; 13(4):713-23.
21. Osterne RLV, Brito RGM, Nogueira RLM, So Jares ECD, Alves APNN, Moura JFB, et al. Saúde bucal em pacientes portadores de neoplasias malignas: estudo clínico-epidemiológico e análise de necessidades odontológicas de 421 pacientes. Rev Bras Cancerol. 2008; 54(3):221-26.
22. Instituto Nacional do Câncer José Alencar Gomes da Silva. Estimativa 2014: incidência de câncer no Brasil [Internet]. Rio de Janeiro: INCA; 2014 [cited in 10 nov 2015]. Available in: http://www.saude.sp.gov.br/resources/ses/perfil/gestor/homepage/outros-destaques/estimativa-de-incidencia-de-cancer-2014/estimativa_cancer_24042014.pdf.

CONTRIBUTIONS

Tamires Vieira Carneiro took part in the conception of the study, data collection, data analysis, and article writing. **Raphael Cavalcante Costa** was responsible for the writing of the article. **Isabella Lima Arrais Ribeiro** participated in data collection and final review. **Marcos Valério Teixeira** and **Luiz Felipe Bastazini** were responsible for the final review. **Eufrásio de Andrade Lima Neto** took part in the data analysis and in the final review. **Ana Maria Gondim Valença** was responsible for the conception of the study and for its final review.

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