The impact of oral health on quality of life in individuals with head and neck cancer after radiotherapy: the importance of dentistry in psychosocial issues

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ABSTRACT

The aim of this study was to assess the impact of oral health on the quality of life of patients with head and neck cancer after radiotherapy, combined or not with chemotherapy, and to compare it with that of patients with no history of neoplasia. A total 75 individuals were evaluated,including 30 with head and neck cancer after radiotherapy (study group) and 45 with no history of cancer (control group). All patients were evaluated according to World Health Organization criteria: caries activity by DMTF index, presence of periodontal disease by CPI index, edentulism index and impact of oral condition on quality of life through the OHIP-14 questionnaire. Statistically significant differences were found between the study group (SG) and the control group (CG)for caries activity conditions ($p < 0.001$), periodontal disease ($p < 0.001$) and missing teeth ($p < 0.001$). These conditions had an average impact on the quality of life of cancer patients. The oral health condition of individuals with head and neck cancer deteriorates after radiotherapy, with direct impact on their quality of life.

Key words: *Quality of life, Head and neck neoplasms, Radiotherapy, Oral health.*

O impacto da condição bucal sobre a qualidade de vida de indivíduos com câncer de cabeça e pescoço após radioterapia: a importância da odontologia nos aspectos psicossociais

RESUMO

O objetivo desta pesquisa foi avaliar o impacto da saúde bucal sobre a qualidade de vida de pacientes com câncer de cabeça e pescoço após radioterapia e comparar com pacientes sem histórico de neoplasias. Foram avaliados no total 75 indivíduos, 30 indivíduos com câncer de cabeça e pescoço após radioterapia (grupo de estudo), e 45 indivíduos sem histórico de câncer (grupo controle).Todos receberam avaliação da condição bucal de acordo com critérios da Organização Mundial de Saúde: a atividade de cárie pelo índice CPOD, presença de doença periodontal pelo índice IPC, índice de edentulismo e por fim o impacto da condição bucal sobre a qualidade de vida, através do questionário OHIP-14.Quando comparados o grupo de estudo e grupo controle foi encontrada diferença estatística significativa para as condições de atividade de cárie ($p<0,001$), doença periodontal ($p<0,001$) e ausência de dentes ($p<0,001$). Estas condições apresentaram impacto médio sobre a qualidade de vida dos pacientes.A condição de saúde bucal de indivíduos com câncer de cabeça e pescoço depois da radioterapia é deteriorada e impacta diretamente sobre a qualidade de vida destes pacientes.

Palavras chave: *Qualidade de vida, Neoplasias de cabeça e pescoço, Radioterapia, Saúdebucal.*

Introduction

In Brazil, approximately 17.500 new cases of head and neck cancer in males and 5.340 in females were estimated in the year 2016[1]. Treatment of head and neck cancer primarily involves surgery and radiotherapy, which may or may not be combined with chemotherapy, depending on the stage of the disease[2]. The main oral complications caused by these therapies are oral mucositis, radiodermatitis, vascular lesions, tissue atrophy, dysgeusia, fibrosis of tissues and muscles, mucosal edema, soft tissue necrosis, decreased saliva flow, opportunistic infections, radiation caries and osteoradionecrosis[3-5].

The oral condition of head and neck cancer patients deteriorates due to the antitumor treatment and may compromise the masticatory function as a result of damage to tooth integrity, periodontal structures, mandibular and maxillary support, temporo-mandibular joint, masticatory musculature, facial expression and tongue, as well as their tissues, innervation and vascularization[6,7]. The diagnosis of oral conditions and oral health care should thereforebe part of multidisciplinary cancer care, with the aim of providing comprehensive treatment, including physical and emotional support to patients[5,8].

Researchers have been developing tools to assess the impact of oral health related to the quality of life of systemically compromised individuals[9]. Within this context, the World Health Organization (WHO) has included this topic among their targets for 2020[10], to provide routine patient treatment which includes both physical and psychosocial aspects related to oral problems[11-13]. To date, we have found only one article in the national and international literature relating the oral condition of individuals treated for head and neck cancer to impact onquality of life [7].

The aim of this study was to evaluate the oral health of head and neck cancer patients after radiotherapy, combined or not with chemotherapy, and compare it to that of patients without a history of cancer in order to trace the disease profile in the post-cancer phase.

MATERIALS AND METHODS

The current research was approved by the Human Ethics and Research Committee of the School of Dentistry of Bauru of the University of São Paulo (nº 703.115). A total 75 patients were divided into two groups: the study group (SG) and the control group (CG), matched according to age. The SG consisted of 30 individuals with head and neck cancer after radiotherapy, combined or not with chemotherapy. The CG consisted of 45 individuals without a history of cancer who were in good health and received dental care at the Bauru School of Dentistry - USP.

Evaluation of oral condition

Oral condition was evaluated according to the DMFT index (Decayed, Missing and Filled Teeth), community periodontal index (CPI) and evaluation of the use and need of prostheses. Data were collected by a calibrated dentist following the WHO Oral Health Surveys: Basic Methods instructions.

The individual DMFT index was calculated by adding the scores. The DMFT of the population was calculated by dividing the sum of the individual DMFT values by the number of patients examined, which provided a classification of caries activity**.**

The CPI was applied by using a blunt periodontal probe recommended by the WHO, a flat dental mirror and a disposable wooden spatula under artificial light. Presence of biofilm, dental calculus and periodontal pockets was recorded for the buccal and lingual surfaces of six index teeth: right upper first molar (16), right upper central incisor (11), left upper first molar (26), lower left first molar (36), lower left central incisor (31) and the first lower right molar (46).

The evaluation of edentulism followed WHO guidelines for epidemiological surveys. It considered type and site of prosthesis, mandibular or maxillary, according to the prosthetic spaces corresponding to the missing teeth observed in the physical examination.

Evaluation of the impact of oral health on quality of life

The assessment of the impact of oral health on quality of life was carried out using the Oral Health Impact Profile (OHIP-14), composed of 14 questions proposed by Slade (1997)[14]and validated in the Portuguese language by Oliveira and Nadanovsky (2005)[15]. The OHIP-14 analyzes the impact on quality of life by the dimensions of oral health, which are the following: functional limitation, physical pain, psychological discomfort, physical incapacity, psychological incapacity, social incapacity and disability, according to the weights for the answers obtained.

The response scale (0 = never, 1 = hardly ever, 2 = sometimes, 3 = almost always, 4 = always) was multiplied by the corresponding weight to calculate total impact. Impact was considered weak 0 - 1.33, average 1.33 -2.68, and strong > 2.68. Overall impact was given by the sum of the impact of the dimensions, and considered weak for scores of less than 9.33, medium 9.33 -18.66 and strong > 18.66.

Statistical analysis

The Kruskal-Wallis test was used for all multiple comparison procedures by the Dunn method, considered significant when $p < 0.05$.

RESULTS

Table 1 shows the demographics, including age, sex, type and location of the neoplasia, submitted to radiotherapy combined or not with chemotherapy, and type of radiotherapy.

In SG, DMFT ranged from 17 to 28 with a median of 24, while in CG it ranged from 12 to 32 with a median of 18. The difference between SG and CG was statistically significant ($p < 0.001$) (Table 2**).**

Table 1: Demographic data related to gender, type and location of cancer, type of radiotherapy and chemotherapy as combined therapy of SG (n = 30).

Genre	Men (25)
	Women (5)
Typeofneoplasm	CEC-Squamous cell carcinoma (27)
	Cystic Adenoid Carcinoma (1)
	Invasive Basal Cell Carcinoma (1)
	Mucoepidermoid Carcinoma (1)
Location of the neoplasm in the head and neck region	Amygdala; Tonsil palate (7)
	Tongue (4)
	Buccal floor (4)
	Gum (3)
	Nasopharynx (3)
	Larynx (3)
	Cheek mucosa (2)
	Vocal cords (1)
	Adenoid (1)
	Lips (1)
	Hypophysis (1)
Typeofradiotherapy	Conventional (22)
	**IMRT (8)
Combined chemotherapy for antineoplastic treatment	Yes (17)
	No (13)

*IMRT- Intensity-modulated radiotherapy

Table 2: Data related to age, ** DMFT index and ** CPI index.

Group	n	Age			DMFT				CPI			
		Minimum	Maximum	Median	Minimum	Maximum	Median	P-value	Minimum	Maximum	Median	P-value
Study	30	35	79	61	16	28	24	*p=0.001	0	4	2	*p<0,001
Control	45	35	78	52	12	32	18		0	1	0	

* Significant statistical difference (p> 0.05) (n = 100).
** DMFT-Index of decayed, missing and filled teeth; CPI- Community Periodontal Index

Periodontal disease was present in 29 of the 30 individuals inthe SG (96.66%). In SG, the CPI index ranged from 0 to 4 with a median of 2, while in CG it ranged from 0 to 1 with a median of 0. The difference between SG and CG was statistically significant (p <0.001) (Table 2).

With regard to edentulism, 96.7% of the SG and 77.8% of the CG needed oral rehabilitation with some type of dental prosthesis. The WHO scores edentulism provided the following results: the use of an upper prosthesis with median SG (2, 1st quartile = 0 and 3rd quartile = 4.5), and in the median CG (0; 1st quartile = 0 and 3rd quartile = 0.5) (p <0.001). Use of lower prosthesis with median SG (0, 1st quartile = 0 and 3rd quartile = 0.75), and median CG (0, 1st and 3rd quartiles = 0), no statistical difference was found.

Need for upper prosthesis, with median SG (0, 1stquartile = 0 and 3rd quartile = 1) and median CG (1, 1st quartile = 0 and 3rd quartile = 2) (p <0.001). Finally, the need for lower prosthesis with median SG (2; 1stquartile = 2 and 3rdquartile = 2) and median CG (0; 1stquartile = 0 and 3rdquartile = 1) (p <0.001). Values for impact of oral condition on quality of life in the SG were 4.67 to12.94, with a median of 9.62, indicating medium impact. In contrast, the values in the CG were 0 to6.42, with median of 1.48, indicating weak impact. The impact of oral condition on quality of life differed significantly between SG and CG (p <0.001).

DISCUSSION

Two thirds of head and neck cancer patients have localized or regionally advanced disease, and although there is controversy regarding the best treatment, they are usually treated with surgery, and radiotherapy, which may or may not be combined with chemotherapy (multimodal treatment). These therapies have adverse effects on oral health, especially if oral diseases such as caries and periodontal disease are already present, and invariably compromise quality of life[2].

Among the most frequent complications that compromise patient quality of life are reduction or absence of salivary flow, radiation cavities, periodontitis, odynophagia, dysphagia, pain and speech difficulties[17], which may compromise the patient's social, nutritional and global health and quality of life as a whole.

The DMFT index estimated by the WHO is 1.2 to 2.6, the current value for the Brazilian population being 2.1[18]. The present study reveals a noticeable discrepancy between the national index and the indices for the population that received radiation for the head and neck region The incidence found in the literature was similar to that found in this study (DMFT = 24 / median), which is a high index, considering that the individuals in these studies ended radiotherapy over 6 months ago[18-20]. The literature includes studies conducted on patients of specific ethnicities, but in all of them, time after treatment seems to be a determining factor for the effects of antineoplastic therapies on caries activity, which may be greater, especially when it is induced by radiotherapy and chemotherapy[18-20].

The incidence of periodontal disease in post-antineoplastic therapy head and neck cancer patients is poorly described in the literature, but it is about 64% to 78% [20,21]. Our study found an incidence of 96.6%, and a significant difference in CPI between SG and CG (p <0.001), revealing that periodontal disease is also a matter of concern in this group of patients, mainly due to infection control and evolution to tooth loss. Tooth loss is common in the evolution of periodontal disease because it is difficult to control[22]. Many studies mention the relevance of performing periodontal disease prevention prior to treatment with radiotherapy / chemotherapy, because periodontal disease is more difficult to control after antineoplastic therapies[5,20,22,23].

Radiotherapy increases the risk of osteoradionecrosis, especially when the dose exceeds 60 Gy and is associated with local trauma such as dental extractions, and infections such as uncontrolled periodontal disease, and compromised by hyposalivation[24,25].

Edentulism in individuals treated for head and neck cancer has not yet been evaluated, according to a review of the literature in English and Portuguese. Although the absence of teeth is described in oral rehabilitation studies after radiotherapy, the incidence of edentulism is not reported. Our study found significant differences between SG and CG (p <0.001) with a high incidence of oral rehabilitation (46.6%), mainly related to the need for prostheses in the maxillary and mandibular arches. These results lead us to reflect on the limitations related to missing teeth, often prior to radiotherapy and surgery. With regard to the evolution of radiation cavities and periodontal disease as a consequence of radiotherapy, oral rehabilitation options are often denied by dentists because of the limited therapeutic options. Prosthetic rehabilitation and/or dental implants are still questioned in the literature; however, it is mentioned that having received radiotherapy is not an impediment for rehabilitation.It is clear that it is necessary to establish strict criteria regarding the type, dose and area of radiotherapy[26]in order to achieve adequate oral rehabilitation forthe patient. Edentulism itself impacts quality of life, leading to functional, aesthetic, social and psychological changes.

The psychosocial aspects related to oral problems have been of interest to the WHO since the 1980s, when the consequences of diseases in people's daily

lives were classified, and since 2000 these aspects have been related to dentistry. In this context, the OHIP-14 questionnaire provides answers related to the dimensions of physical and psychosocial limitations that can diagnose the impact of oral health on quality of life. The literature contains only one report of research in the field of head and neck cancer in which the Oral Health Related to Quality of Life (OHRQoL) questionnaire was used to associate oral condition and quality of life after radiotherapy[7], and none using the OHIP-14. In the current study, the OHIP-14 questionnaire showed that the impact of oral health on quality of life in SG was average (9.62), and differed significantly from CG (1.48) ($p < 0.001$). These results reveal a clear diagnosis and an alert forthe need for care in the return to and maintenance of oral health of individuals who under go radiotherapy in the head and neck region, as well as the need for further research on the relationship between oral status and quality of life.

Acute and late complications of antineoplastic therapy such as oral mucositis, dysgeusia, radiation caries, periodontal disease and osteoradionecrosis of the maxilla[5] have a relevant effect on the patient, reducing his/herquality of life. Clearly these complications can be appropriately reduced and controlled with prior dental treatment and proper conservation.

Considering the results of this study, it is important to reflect on the biological limits of oral health maintenance and oral rehabilitation of patients who under go antineoplastic treatment, especially radiotherapy to treat head and neck cancer. It is also important to understand that the multidisciplinary team, including dentists, should be committed not only to curing cancer, but also to returning quality of life to patients, provided that everyone understands the limitations and the possibilities of applying consolidated techniques to return these patients to oral health.

CONCLUSIONS

Caries activity, periodontal disease index and incidence of edentulism are high in individuals undergoing radiotherapy to treat head and neck cancer. These oral conditions significantly and negatively compromise the quality of life of these patients.

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