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Oral health impact profile of head and neck cancer patients after or before oncologic treatment: an observational analytic case-control study

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Abstract

Purpose The objective of this study was to investigate the impact of oral health on the quality of life of patients with head and neck cancer (HNC) before and after oncologic treatment.

Methods Forty cancer-free individuals (Cf group) and 40 HNC patients (Hnc group) were included in this study. Hnc group was also divided into two subgroups: Hnc 1 (pre-cancer therapy, $n = 20$) and Hnc 2 (post-cancer therapy, $n = 20$). Participants were asked to complete a short form of Oral Health Impact Profile (OHIP-14). The results were statistically analyzed with the multivariate analysis of variance with post-hoc Scheffé multiple comparison.

Results It was observed a moderate impact on the quality of life on HNC patients, with values on Hnc 2 group significantly higher in the functional limitation when compared to the Hnc 1 group ($p < 0.05$). When compared to the Cf group, the values found on Hnc group were higher on functional limitation ($p < 0.01$) and at the total score ($p < 0.05$), whereas Hnc 2 group had significant superior values on functional limitation ($p < 0.01$), physical pain ($p < 0.05$), and total score ($p < 0.01$)

Conclusion These results show that there is an oral impairment that depreciates the quality of life of patients with an experience of HNC, principally after treatment, indicating the importance of the inclusion of professionals responsible for dental and oral care with the oncologic team to monitor the oral condition of these patients.

Keywords Cancer · Head and neck cancer · Quality of life · OHIP

Introduction

The current medical literature is characterized by a constant zeal for the quality of life of patients during and after various kinds of therapies. This humanized position reflects a concern not only for the cure of the disease, but also to guarantee the individual physical, social, and emotional satisfaction throughout and after the treatment. Measuring the negative impact on life quality of a disease, as well as that of its therapy, is an important tool for highlighting points that need improvement in medical care. In this regard, perhaps the most emblematic group of diseases regarding the side effects of their treatment is cancer, since although effective in the elimination of neoplastic cells, healthy cells are also affected in the process [1]. In addition, the manifestation of complications does not end at the end of treatment and may occur late in life [2]. This feature is especially worrying when we consider that a significant portion of the population is a survivor of the disease, reaching approximately 4% in the USA [3].

Among the neoplasms, head and neck cancer (HNC) is the subgroup that affects the oral cavity, nasal cavity, larynx, and pharynx regions, being the sixth most common cancer in the world [4] and totaling about 640,000 new cases annually [5]. Its treatment is based on surgical resection, radiotherapy, and chemotherapy, with a single approach or a combination of techniques [6]. Because it is a noble anatomical region in the esthetic and physiological aspects, this management is a great challenge and can bring severe impacts on the quality of life.

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It is already well described in literature the influence of head and neck antitumor treatment over several oral and perioral tissues, such as tooth, periodontium, temporomandibular joint, mandibular and maxillary bone, tongue, innervation, vascularization, and masticatory and facial expression muscles [7]. In contrast, many researchers point out that the literature is scarce regarding how specifically the oral condition can compromise the quality of life in patients with an experience of head and neck cancer [7–11]. The importance to fulfill this gap can be noticed by the inclusion of this topic by the World Health Organization (WHO) among their targets for 2020 [7, 12].

Since the impact that a condition can exert on an individual's quality of life is a particular and subjective analysis, an instrument that tries to quantify this information is the Oral Health Impact Profile (OHIP) [13]. This questionnaire was initially designed with 49 questions that highlight the frequency that certain oral events with the potential to compromise the quality of life occur. However, its reduced form with only 14 questions (OHIP-14) has already had its reliability, validity, and accuracy of confirmed [13].

Thus, the objective of this study was to evaluate the impact of the oral condition on the quality of life of individuals with HNC prior to the initiation of cancer treatment, individuals who have already received oncologic treatment for HNC and cancer-free patients using OHIP-14.

Materials and methods

This study was approved by the Research Ethics Committee of Bauru School of Dentistry - University of Sao Paulo, and all participants signed a free and informed consent form prepared according to the Helsinki Declaration. The hypothesis of this study was that patients with an experience of head and neck cancer would have a higher impact on quality of life related to oral health when compared to cancer-free individuals, whereas the null hypothesis was that no difference would be detected among groups. For that, an observational analytic case-control study design was used.

Selection criteria

Patients with a diagnosis of HNC, of both sexes, of any race, ≥ 18 years, and submitted or not to radiotherapeutic and chemotherapeutic treatment were included. Pregnant women, the terminally ill patients, or those who did not wish to participate in the study were excluded. The patients were invited to participate according to the order of admission at the oncologic clinic at Bauru School of Dentistry - University of Sao Paulo, from August 2014 to December 2015. The cancer diagnosis was performed by the medical staff in charge of oncologic treatment. Patients included in the group with a history of head and neck cancer (Hnc) were divided into

two subgroups according to the stage of cancer treatment they were in:

- Hnc 1: recent diagnosis of cancer and without beginning of radiotherapy and/or chemotherapy ($n = 20$);
- Hnc 2: post-radiotherapy and/or chemotherapy phase ($n = 20$).

To assess the power of impact over the quality of life due to the oral condition, another 40 cancer-free individuals (Cf group), matched in age and gender to Hnc group, were also recruited according to the order of admission at screening sector at the same institution and period.

Quality of life questionnaire assessment

All participants answered an oral health-related quality of life questionnaire (OHIP-14) [13]. This questionnaire is a tool to evaluate the individual's perception of the impact of oral disorders on their well-being, bringing a global and a fragmentary analysis through the investigation of seven dimensions: functional limitation, physical pain, psychological discomfort, physical disability, psychological disability, social disability, and handicap. Each dimension is formed by two questions whose answers are coded on a scale of 0 to 4, being: 0 = never, 1 = hardly, 2 = sometimes, 3 = almost always, and 4 = always. The scores obtained are multiplied by different weights that reflect the opinion of the population about the importance of an item to the detriment of its pair in each dimension. Thus, after this compensation, the value achieved in each dimension varies between 0 and 4 and the sum of the overall score between 0 and 28 [13].

Statistical analysis

The results obtained were statistically analyzed in the GraphPad Prism 6.0 software, adopting in all tests a significance level of 5%. The prevalence of genders was investigated using the chi-square test. The impact of the oral condition on the quality of life investigated through the application of the OHIP-14 questionnaire (total score and dimensions) and statistically analyzed with the multivariate analysis of variance (MANOVA) with post-hoc comparisons between groups with Scheffé multiple comparison.

Results

There was no statistically significant difference between the groups regarding age ($p = 0.48$) and gender ($p = 0.77$) of the participants (Table 1). Among the patients with HNC experience, the most prevalent tumor type was squamous cell carcinoma (SCC), followed by other types of carcinomas (Table 2).

Table 1 Sample distribution by age and gender

	Hnc 1	Hnc 2	Hnc (Hnc 1 + Hnc 2)	Cf
N	20	20	40	40
Age (years)	53.75 ± 16.91	58.3 ± 10.63	56.02 ± 14.05	59.00 ± 11.38
Gender (%)				
Male	75%	85%	80%	82.5%
Female	25%	15%	20%	17.5%

The highest incidence of tumors was observed in the oral cavity, followed by pharynx and larynx (Table 2). Among the already treated patients (Hnc 2), 55% performed radiotherapy + surgery, 35% radiotherapy + chemotherapy + surgery, and 10% chemotherapy + surgery. Thus, 90% of the members of the Hnc 2 group underwent radiotherapy.

The values obtained in OHIP-14 indicated that an experience with head and neck cancer leads to a negative impact on patients' quality of life (domains of functional limitation, physical pain, and total score), as described in Table 3. Patients already undergoing oncologic treatment also had a higher negative impact on quality of life on functional limitation dimension than those that did not start the treatment (Table 3).

Discussion

This study investigated the impact of head and neck cancer over oral health on the quality of life of individuals affected by the disease compared to cancer-free ones. The moderate impact found in this research deserves great attention when we consider that individuals experiencing cancer tend to be emotionally fragile. In the USA, the incidence of suicide is more than three times higher in patients with HNC than in the general population [14].

As observed, patients with HNC experience reported a statistically superior impact on quality of life when compared to cancer-free individuals in the functional limitation ($p < 0.01$) and at the total score ($p < 0.05$). There was no significance for physical pain, psychological discomfort, physical disability, psychological disability, social disability, and handicap. However, considering only post-treatment group (Hnc 2), there was a statistically superior impact when compared to cancer-free individuals on functional limitation ($p < 0.01$), physical pain ($p < 0.05$), and total score ($p < 0.01$). In a comparison between Hnc 1 and Hnc 2, only the functional limitation was statistically higher in the post-treatment group ($p < 0.05$). This result possibly reflects the sequelae of surgical approaches to tumor removal and the effects of chemo and radiotherapeutic treatments. Buccal tissues are highly susceptible to the toxic side effects of chemotherapy. The prevalence of oral complications associated with treatment ranges from < 10 to 80%, depending on the type of tumor and chemotherapy. Radiotherapy affects the oral tissues with their ionizing radiation only when the region is included in their area of incidence [1]. These undesirable influences can lead to secondary events that compromise patients' quality of life, and may even lead to the interruption of cancer treatment [6].

Other studies that used the OHIP-14 to make a similar comparison did not apply the criterion of weight assignment for each item within the dimensions, which prejudices a faithful comparison with our results. Barrios et al. [8] analyzed the OHIP-14 by the additive method, where the sum of the score is done directly, generating a variance between 0 and 56 total points. Their results had a statistically higher impact in the

Table 2 OHIP-14 scores

	Hnc 1	Hnc 2	Hnc (Hnc 1 + Hnc 2)	Cf
Functional limitation[1]	1.25 ± 1.02	2.34 ± 1.20	1.79 ± 1.23	0.68 ± 0.91
Physical pain[2]	1.96 ± 1.07	2.45 ± 1.27	2.20 ± 1.19	1.49 ± 1.23
Psychological discomfort	1.98 ± 1.35	1.80 ± 1.25	1.89 ± 1.29	1.53 ± 1.13
Physical disability	1.51 ± 1.30	1.64 ± 1.39	1.57 ± 1.33	1.01 ± 1.09
Psychological disability	0.78 ± 0.71	1.13 ± 0.93	0.95 ± 0.83	0.96 ± 0.87
Social disability	1.38 ± 1.10	1.36 ± 0.99	1.72 ± 1.03	0.80 ± 1.04
Handicap	1.27 ± 1.23	1.42 ± 1.21	1.34 ± 1.21	0.86 ± 1.18
Total score[3]	10.14 ± 4.84	12.17 ± 4.35	11.15 ± 4.66	7.35 ± 5.69

[1] MANOVA post-hoc Scheffé multiple comparison (Hnc 1 vs. Hnc 2, $p < 0.05$), (Hnc2 vs. Cf, $p < 0.01$), and (Hnc vs. Cf, $p < 0.01$)

[2] MANOVA post-hoc Scheffé multiple comparison (Hnc2 vs. Cf, $p < 0.05$)

[3] MANOVA post-hoc Scheffé multiple comparison (Hnc2 vs. Cf, $p < 0.01$); (Hnc vs. Cf, $p < 0.05$)
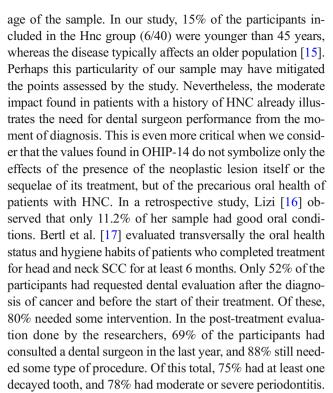
Table 3 Tumors sites and classification according to medical staff

	Hnc 1	Hnc 2
SITES		
Oral		
Lips	3	–
Gingiva and alveolar mucosa	3	–
Mobile tongue and mouth floor	8	6
Retromolar trigone	–	1
Parotid	1	–
Pharyngeal		
Base of tongue	–	2
Tonsillary fossa	1	–
Uvula and tonsil	1	2
Tonsillar pillar	–	2
Parapharyngeal space	–	1
Nasopharynx	–	1
Oropharynx	1	1
Hypopharynx	1	–
Laryngeal		
Larynx	1	–
Vocal fold	–	4
CLASSIFICATION		
Squamous cell carcinoma	10	14
Epidermoid carcinoma	2	–
Cystic adenoid carcinoma	–	1
Microcystic adnexal carcinoma	1	–
Unclassified carcinoma	2	1
Uninformed	5	4

sick group compared to cancer-free in all dimensions ($p < 0.001$) and in the total score (18.9 ± 11.8 vs. 5.9 ± 6.2, $p < 0.001$). Barrios et al. [9] also noted the presence of an impact on quality of life when analyzing the OHIP-14 through simple counting, where the sum of the items where the answers were "sometimes," "almost always," and "always." By this method, the maximum score is 14 points, and their result was 5.8 ± 3.7 in the population with neoplasia. The sample of both studies was formed by participants with oral and oropharyngeal cancer after cancer treatment, and the most common treatment received was surgery without chemotherapy and/or adjuvant radiotherapy. In our study, none of the participants had oncologic therapy as the surgery alone, and 90% of them received radiotherapy as the main treatment or associated with chemotherapy or surgery. On the other hand, Karbach et al. [10] evaluated the quality of life related to oral health of patients with oral SSC pre-treatment also by the additive technique, obtaining a total value of 8.81 ± 8.6.

It is noteworthy that, although a medium impact of the oral condition on quality of life was observed in this study, the results may have been underestimated due to the average

age of the sample. In our study, 15% of the participants included in the Hnc group (6/40) were younger than 45 years, whereas the disease typically affects an older population [15]. Perhaps this particularity of our sample may have mitigated the points assessed by the study. Nevertheless, the moderate impact found in patients with a history of HNC already illustrates the need for dental surgeon performance from the moment of diagnosis. This is even more critical when we consider that the values found in OHIP-14 do not symbolize only the effects of the presence of the neoplastic lesion itself or the sequelae of its treatment, but of the precarious oral health of patients with HNC. In a retrospective study, Lizi [16] observed that only 11.2% of her sample had good oral conditions. Bertl et al. [17] evaluated transversally the oral health status and hygiene habits of patients who completed treatment for head and neck SCC for at least 6 months. Only 52% of the participants had requested dental evaluation after the diagnosis of cancer and before the start of their treatment. Of these, 80% needed some intervention. In the post-treatment evaluation done by the researchers, 69% of the participants had consulted a dental surgeon in the last year, and 88% still needed some type of procedure. Of this total, 75% had at least one decayed tooth, and 78% had moderate or severe periodontitis.

In turn, Niewald et al. [18] evaluated patients before radiotherapy, where they observed that 11% of the patients had chronic periodontal disease with loss of insertion from mild to moderate and 40% with severe. Jham et al. [19] also found unsatisfactory oral conditions in patients prior to initiation of treatment. From a total of 207 individuals, 57.9% presented some oral alterations, 41% had periodontal disease, 21.2% residual roots, 12% caries, 7.2% candidiasis, and 5.8% impacted teeth. Restorations were indicated for 15.9% of the participants and extraction for 50.2%.

Schuurhuis et al. [20] cataloged the information of patients obtained prior to the oncological treatment and observed a presence of oral infection in 75% of patients, periodontal pocket with ≥ 6 mm in 23%, severe caries in 4%, impacted teeth in 4%, and residual roots at 3%. Periodontal treatment had to be performed in 6% of the patients and extraction in 30%, resulting in the mean removal of 7.7 teeth.

Conclusion

The results of these studies indicate that there is an impairment of the quality of life of patients with an experience of HNC due to oral reasons, being statistically higher when compared post-treatment patients with cancer-free individuals regarding physical aspects (functional limitation and physical pain). This result might be a reflex of the side effects of the oncologic therapy on oral and perioral tissues. It should be noted that only the functional limitation dimension showed a statistically significant difference between the beginning and after the

conclusion of the treatment, but there was also a considerable impact on quality of life already present since the diagnosis of cancer. With this, the importance of an adjuvant follow-up of the dentist at the beginning, throughout the course, and at the post-treatment period of the oncological treatment to improve the quality of life of this group of patients is evident.

Compliance with ethical standards

Conflict of interest The authors declare that they have no conflict of interest.

Research involving human participants All procedures performed in studies involving human participants were in accordance with the ethical standards of the national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed consent Informed consent was obtained from all individual participants included in the study.

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