Journal of Applied Cosmetology

ISSN 2974-6140 (online) ISSN 0392-8543 (print)

Observational Study

Prevention dental hygiene program in oncology patients

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Keywords: *prevention program, oral health, oncological treatments, chemotherapy, side effects, periodontal disease*

Received: 24 July 2024
Accepted: 05 September 2024

ISSN 2974-6140 (online) ISSN 0392-8543 (print).

ABSTRACT

This study aimed to assess the impact of on oral health in oncological patients. A Prevention Dental Hygiene Project was conducted in the Day-Hospital Oncology Unit. Fourteen patients who satisfied the inclusion criteria at their first visit were enrolled voluntarily. Their oral health conditions were evaluated using the Bleeding on probing (BoP), Visible Plaque Index (VPI) at the initial stage (T0), one month (T1), and two months after (T2) The results showed an improvement in inflammatory and plaque indices in patients who attended all visits and followed the instructions provided. In conclusion, the dental project implemented on frail patients highlights the significance of preventive measures and the value of multidisciplinary collaboration in the field of medicine.

INTRODUCTION

Increasing attention is being paid to the correlation between systemic disease and oral health (1). The cancer patient represents an example of such a correlation, where problems due to the disease are reflected in the oral cavity, especially in terms of oral manifestations due to the treatments these patients undergo (2). The correlation with the oral cavity is not only represented by such manifestations but also by its influence on periodontal disease.

Periodontal issues continuously grow worldwide and affect approximately 60% of the population. Periodontitis is a progressive inflammatory disease of the tooth-supporting tissues (gingiva, periodontal ligament, alveolar bone, and cementum). It has a multifactorial etiology and originates in response to periodontopathogenic agents within the dental plaque biofilm on tooth surfaces near the gingiva (3, 4).

Periodontal disease can be prevented and efficiently treated in its early stages; however, it can progress to chronic and irreversible states with significant destruction of the supporting tissues (5). The incidence of malignancies in Italy and the rest of the world is also steadily increasing, with approximately 400,000 new cases in 2012, representing the second leading cause of death after cardiovascular disease and 30% of all deaths.

Oral complications of oncological treatment are different, and they can have a relevant negative impact on the quality of the affected patient's life, the outcome of therapies during the treatment phase, and, therefore, the prognosis of the neoplastic pathology (6, 7).

All oncological therapies have undesirable side effects, affecting the oral cavity. Therefore, the patient's treatment plan includes, in addition to the therapeutic course, the prevention and treatment of therapy-induced side effects and, if necessary, the planning of prosthetic rehabilitation (8-10). The dental hygienist must be a guarantor of the oncological patient's health, intercepting and preventing adverse oral conditions and assisting the patient in maintaining good oral health at home (11). In addition, dental hygienists must be part of the oncology treatment team, together with dentists and other specialists, so that oral health promotion and treatment of oral lesions associated with systemic diseases and/or their therapies are possible (6, 12-14). The following observational study illustrates the effectiveness of this multidisciplinary collaboration in taking care of patients with cancer from a dental perspective.

MATERIALS AND METHODS

Study design and inclusion criteria

This observational epidemiological study was based on the "Prevention and Treatment of Oral Problems". The Project was conducted at the Dentistry and Maxillo-facial Surgery Unit (University of Verona) in collaboration with the Day-Hospital Oncology Unit of the Integrated University Hospital of Verona in 2023.

The prevention initiative was promoted to patients through dépliants and the communication of the project in the therapy rooms of the Oncology Day-Hospital Unit. Interested patients can schedule an appointment for the first visit, where the inclusion criteria are assessed. The inclusion criteria were as follows.

- signature for informed consent;
- positive diagnosis of oncological pathology;
- oncological chemotherapy treatment;
- the patient is not in a public or private dental recall program.

The nature and goals of this study and the anonymity in the scientific use of data were clearly presented in the consent form. The Declaration of Helsinki and the good clinical practice guidelines for human research were followed during this study's execution. This observational study received approval from the University Institutional Review Board (Prog. 3921CESC).

Study Protocol

After the project's communication, the Study Protocol provides the first visit, which is held in the Day-Hospital Oncology Unit. In addition to assessing the inclusion criteria at the first visit, an intra- and extra-oral examination of the mucosa, hard and soft tissues, the presence of plaque and/or tartar deposits, and periodontal pockets was performed.

If the clinical picture matched, the patient was asked to voluntarily join the project, thus initiating the project protocol (Table I).

Table I. *Flow chart of the study.*

Timing	Procedures
T0	• First visit with oral examination performed at the Day-Hospital Oncology Unit
T1	• Assessment of periodontal chart for patients who had periodontal pockets at T0 • Assessment of Plaque Index (PI) of Bleeding on Probing (Bop) • Professional Oral Hygiene with plaque detector • Home Oral Hygiene indication/instruction
T2	➢ Approximately 1 week from T1 • Follow-up visit to assess patient compliance and level of Home Oral Hygiene • Assessment of Plaque Index (PI) and Bleeding on Probing (Bop)
T3	➢ 2 months after T2 • Assessment of Plaque Index (PI) and Bleeding on Probing (Bop) • Performing Professional Oral Hygiene with plaque detector

Soft tissue assessment

A periodontal probe (Florida Probe, Florida Probes Company, Gainesville, FL, USA) was used to measure the soft tissues of the periodontium. The parameters considered were Clinical Attachment Loss (CAL),

Probing Pocket Depth (PPD), the Plaque Index (PI), Bleeding on Probing (BOP), and the Gingival Index (GI) (15, 16). The PI and BOP were calculated immediately after probing for PPD. The severity of periodontal disease (17) was measured as moderate (PPD 4 -5 mm) or severe (PPD > 5 mm).

All sites were detected four times: preoperatively (T0), at the first visit according to hospital availability (T1), after 1 week (T2), and after 2 months (T3). In addition, a complete clinical evaluation was performed at T0 to document any general periodontal condition and re-evaluate these conditions at subsequent times.

Statistical Analysis

The statistical results, analyzed using Microsoft Excel, were home oral hygiene habits and devices, Plaque Index (PI), Bleeding on Probing (BOP) at different times, and periodontal health condition (not affected by periodontitis and periodontitis). The "p-value," denoted as "$p < 0.05$," was used to detect statistical differences between the collected and compared data.

RESULTS

Demographic results

A total of 14 (5 men and 9 women) were included in the observational epidemiologic study. The demographic characteristics are reported in Table II.

Table II. *Representation of the sample.*

Variable	*n*	%
Sex		
Male	5	36%
Female	9	64%
Age		
Mean male	60	
Mean female	56	

Oral devices used

The investigation of oral devices used, carried out at T0, showed that 100% of the sample used a toothbrush and toothpaste for daily oral hygiene, 64% used interdental devices such as floss and/or brush, 14% used mouthwashes containing active agents, 21% used generic mouthwashes, and 78% used bicarbonate and water solution as a rinse to be performed several times throughout the day.

Periodontal disease

The T1 survey on periodontal disease showed that 50% of the sample had periodontitis. Of this group, 14% had a moderate form (PPD 4-5 mm), and 86% had a severe form (PPD >5 mm) (13) (Table III).

Table III. *Distribution of Periodontal disease in the sample.*

Periodontal disease	*n*	%
Sample		
Male	7	50%
Female	7	50%
Severity		
Moderate	2	14%
Severe	12	86%

Indices analyzed

Regarding PI and BOP, the evolution of the indices was analyzed in the total sample at T1, T2, and T3 (Table IV).

Table IV. *PI and BOP Index at T1, T2, e T3 in the total sample.*

	T1	T2	T3	p-value
PI (Plaque Index)	55%	45%	33%	*Δ(T1-T3): p=0,001*
BOP (Bleeding on Probing)	24%	19%	16%	*Δ(T1-T3): p=0,001*

Both indices improved, although, for BOP, patients were not bleeding much to begin with. Next, PI and BOP were analyzed again at T1, T2, and T3, dividing the sample into periodontal and non-periodontal and comparing the two indices in the two groups. For PI, there was an improvement in both groups of patients and also for BOP, noting how the bleeding from the beginning was low (Table V).

Table V. *PI and BOP Indexes at T1, T2 e T3 in the two groups (periodontal and non-periodontal).*

	PI	BOP
T1 perio	55%	22%
T1 no perio	55%	25%
T2 perio	42%	14%
T2 no perio	47%	24%
T3 perio	26%	10%
T3 no perio	39%	21%

DISCUSSION

Only a few studies have examined the correlation between cancer treatment and oral manifestations. Such manifestations increase with chemotherapy. Although improvements have been made in such therapies over the years, oral complications remain (18, 19).

The oral mucosa was the most affected site of the oral cavity. The toxicity of chemotherapy profoundly affects the mucosa, leading to the manifestation of oral mucositis (OM) (20, 21). OM is the most reported side

effect in 40-50% of patients undergoing chemotherapy, caused by thinning of the mucosa itself, which atrophies.

Therefore, it is important that these patients also receive dental care, with oral health as the first goal. Oral health is a complex concept because, according to the FDI/World Dental Federation, it comprises the ability to speak, smell, taste, touch, chew, swallow, and convey a range of emotions through facial expressions with confidence and without pain, discomfort, and disease of the craniofacial complex (head, face, and oral cavity) (22).

Dental visits during and after cancer treatment aim to prevent and/or minimize the severity of the side effects caused by the treatments themselves (23). That meta-analysis establishes a protocol for treating complications at all stages of therapy and in the home setting, thus beginning to provide clear guidelines for the care of oncology patients.

In addition, the literature provides several approaches to treat and manage periodontal tissue inflammation, such as hyperbolic, photodynamic, and air-polishing therapies (24, 25). The same thing is being done by the Ministry of Health (26), which draws up Recommendations for the Promotion of Oral Health, Prevention of Oral Disease, and Dental Therapy in Adult Patients with Neoplastic Disease. In that document, all the characteristics necessary to frame a cancer patient from a dental perspective are expressed, and great attention has been paid to chemotherapy-induced side effects.

Oral hygiene is an important preventive tool for these patients. Poor oral hygiene can also become a risk factor for serious diseases, such as osteonecrosis. Therefore, it is important that oncological and frail patients are included in a dental protocol that goes hand-in-hand with specialist medical examinations and oral hygiene education (27-31).

Thus, working on oral health contributes to a better quality of life for these patients and their longevity. Quality of life is essential, and very often, after a cancer diagnosis, it is lacking because patients are let go. Psychological aspects must be taken into consideration (32, 33).

In addition, regarding the oral cavity, letting go of these patients may induce less attention to home oral hygiene measures, potentially leading to poor oral hygiene influenced by the family and social environment (34). This study focuses heavily on this aspect, analyzing inflammatory and plaque indices changes in cancer patients and motivating them to maintain proper oral hygiene. The aforementioned side effects were also investigated without objective parameters, providing guidance and advice to mitigate them.

CONCLUSIONS

This study shows the importance of an oral prevention protocol for patients with debilitating systemic diseases, such as oncology. Little attention has been paid to the side effects of many systemic diseases manifesting in the oral cavity. The project was intended to focus on this particular aspect and to bring oncological patients closer to preventive dentistry, which is often neglected because of the disease itself.

Cases subjected to radiotherapy or antiresorptive and antiangiogenic drugs would deserve a more in-depth discussion that goes beyond this article, where oral prevention can avoid dramatic situations requiring extensive demolitions and complex reconstructions (35). The aim is not to eliminate oral manifestations induced by oncology therapies but to alleviate the discomfort they can cause through their knowledge and administering appropriate products. The secondary purpose is to instill more knowledge regarding these correlations, not only to patients but also to professionals.

As highlighted in other districts, the sharing of the skills of different specialists guarantees a complete evaluation of patients, with an improvement not only in treatment but also in quality of life (36). From the preliminary data of this study, there is an improvement in the oral health conditions of oncological patients. However, it is emphasized that the sample consisted of only a few subjects and the data collected, so further investigations will be needed to corroborate the results obtained.

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