

Effect of the Action of Laser Therapy used in the Treatment of Oral Mucositis in Temporal Follow-up

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Abstract

Oral mucositis is the presence of generalized ulcers that affect tongue, soft palate and buccal floor, commonly found in patients treated for cancer with radiotherapy associated with chemotherapy. The disease can be classified in four degrees, being the first characterized by erythema and the fourth an aggravated condition that exposes the underlying connective tissue. Oral mucositis treatment consists mostly in administration of drugs to treat the symptoms caused by the disease. Low-intensity laser can be a drug-free option to alleviate the symptoms due to its analgesic and anti-inflammatory effect, improving the quality of life of the patient and reducing the cost and hospital stay. To evaluate the effect of low-intensity laser in oral mucositis, 24 patients (3 women and 21 men) were selected for treatment and pain was evaluated by the visual analogue scale (VAS). Analyses of the VAS showed that the laser treatment significantly reduced the pain ($p < 0.0006$). Considering gender analyses, the pain evaluation of the female gender decreased 66.5% and male gender decreased 45.1%. In the present study, we found a marked reduction in the pain indexes (VAS), a fact that is directly related to the decrease in inflammation, as well as pain analgesia, leading to an oncological patient's pain relief, as well as the possibility of improving the quality of life.

Keywords: Oral Mucositis; Laser therapy; Ulcerative injuries; Chemotherapy

Introduction

Oral mucositis is characterized by erythematous, erosive and ulcerative generalized lesions [1], typically bilateral, affecting the tongue, soft palate and buccal floor [2]. These lesions are the common adverse effect of cancer treatment that may increase the risk of local and systemic infection, with a higher prevalence in patients with malignant neoplasms in the head and neck region treated with radiotherapy associated with chemotherapy (approximately 85% of patients). Mucositis can be classified into four degrees of evolution. The first degree is characterized only by the presence of erythema; the second by the appearance of white scaly plates sensitive to contact; the third degree has the appearance of epithelial crusts and fibrous exudate leading to the formation of pseudomembranes and ulcers, the fourth degree, considered one of the most severe forms of mucositis, is represented by the exposure of the underlying connective tissue [3].

Currently, there are some treatments for mucositis that aim, first, at the palliative action of symptoms. Among them, oral rinses containing anti-inflammatories, antihistamines, corticosteroids, antifungal, vitamin E and topical anesthetics. However, the low-intensity laser is a form of treatment whose technique is simple, non-traumatic and non-pharmacological. Among its anti-inflammatory, analgesic, healing and photobio-stimulatory properties, it is used as an effective resource in the treatment of oral mucositis, thus improving the quality of life of the patient, reducing the cost and hospital stay and reducing the risks of incidence of secondary infections or systemic [4]. Thus, this study aimed to evaluate the effects of laser therapy used in patients with mucositis caused by radiotherapy and/or chemotherapy, followed during the whole treatment period, evaluating the degree of improvement of the lesion until the absence of the same.

Materials and Methods

Information was collected by completing a data collection form, in which they were registered. In addition, we analyzed the region affected

by the neoplasia and the treatment being performed. Orientation regarding oral hygiene and treatment information was carried out. An evaluation was made of the degree of mucositis, presence of caries, periodontal disease and candidiasis. The visual analogue scale was used for pain evaluation.

The patients ($n=24$, female gender $n=3$ and male gender $n=21$) were submitted to treatment twice a week using a diode laser (Twin Laser - MMO, São Carlos-SP) emitting wavelength of 660 nm, dose of 20 J/cm² and intensity of 20 mW/cm², in point mode, for 10s per point.

Results

Figure 1 shows the visual analogue scale of pain in patients affected by oral mucositis in a pre and post intervention evaluation. A significant difference was found in the initial and final comparison ($p < 0.0006$), with respective values of 5.91 and 3.12. The observation performed in Figure 2 shows the visual pain scale of female and male patients, affected by oral mucositis after treatment. A greater percentage difference was observed in the pre- and post-treatment evaluation of the female gender (66.5%) in relation to the male patients (45.1%), whose analogue visual scale values start at 5 and end at 1.67 among women and 6.05 and 3.33 among men, respectively.

The evolution of the analogue visual scale is shown in Figure 3. In this figure it is possible to analyze 3 points in each analyzed scale,

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pointing the initial values, intermediate of higher incidence of pain and endings. The representative scale of the male gender resembles a straight line, where the point of greatest incidence of pain is lower than the initial value found. In contrast, female patients present a scale where the highest point of pain is, on average, greater than the initial point, differentiating the evolution model presented among female patients. However, due to the number of female patients, the general range of patients is again similar to a straight line, being this difference found to be equalized and to the N sample of women (n=3) and men (n=21).

Table 1 shows the types of neoplasia found in patients with mucositis. It is a high number of patients affected by head and neck neoplasia (22), in relation to patients with neoplasia in the trunk (1) and neoplasia in other places (1). In addition, it is possible to verify the average number of sessions of treatment of mucositis in relation to the region of treatment of the neoplasia. It is observed 8.2 sessions of treatment of mucositis in head and neck neoplasia, 12 sessions in trunk neoplasia and 3 sessions in patients affected by neoplasia in other places.

Discussion

Oral mucositis is defined as an inflammatory and ulcerative lesion of the mucosa with pseudomembrane formation [5]. It is a side effect due to the antineoplastic treatment, either by radiotherapy, chemotherapy or the two concomitant forms. These interventions, while guaranteeing an improvement in patient survival, are associated with numerous adverse reactions that significantly affect patients' quality of life, and may even affect the course of treatment due to intense pain, opportunistic infections, malnutrition due to low oral ingestion, speech difficulties and prolonged hospitalization [4].

Through a higher number of cancer cases in Brazil, it is expected that the occurrence of oral mucositis is also increased. According to data from the National Cancer Institute (INCA), in 2018 the estimated number of new cases of cancer corresponded to 582.590, with malignant neoplasms located in the head and neck region corresponding to 8.9% in men and 6.3% in women. It is also known that, patients with neoplasias located in this region increase the probability of oral mucositis, where, in this way, the large number of lesions in cancer patients is explained [6].

In this way, new therapeutic approaches are constantly being proposed all over the world for the treatment of mucositis, with the aim of improving the quality of life of the patient. Today, there are many topical medications to reduce symptoms, but the efficacy of all of them in prevention and treatment is not well known, as the literature shows. In addition, systemic medications are also indicated, however adverse effects are inherent, making it necessary to use other drugs to minimize them [7].

Several studies state that technological resources, such as the low-intensity laser, have a great deal of effectiveness and bring numerous benefits to the patient [8]. The photobiomodulation process, in addition to having an anti-inflammatory and analgesic action, also promotes enzymatic modulation, as well as mitochondrial

structural and functional alteration, allowing an increase in adenosine triphosphate (ATP) production. By providing the anti-inflammatory action, the organism modulates the production of inflammatory cytokines, increasing the production of anti-inflammatory cytokines, clinically reducing the symptoms of swelling and excessive red staining, characteristic of the inflamed tissues, as well as the reduction of structures present in the oral mucositis, relieving pain through analgesia [9].

In the present study, we found a marked reduction in the pain indexes (Visual Analogue Scale), a fact that is directly related to the decrease in inflammation, as well as pain analgesia (Figures 1, 2 and 3). As observed in Figure 3, which characterizes the images of a patient after a treatment session, it is possible to verify the pronounced regression of the oral mucositis lesion, allowing the improvement of the quality of life. It is important to consider the importance of the result obtained in relation to the site of neoplasia to which the patients are affected in this study, where approximately 95% of the patients were being treated in neoplasia of the head and neck region. Thus, after analyzing the results obtained and considering the above information, it can be observed that the proposed treatment was efficient, since there was a significant improvement of the lesions and, consequently, the quality of life of the patient, besides not being reported adverse effects.

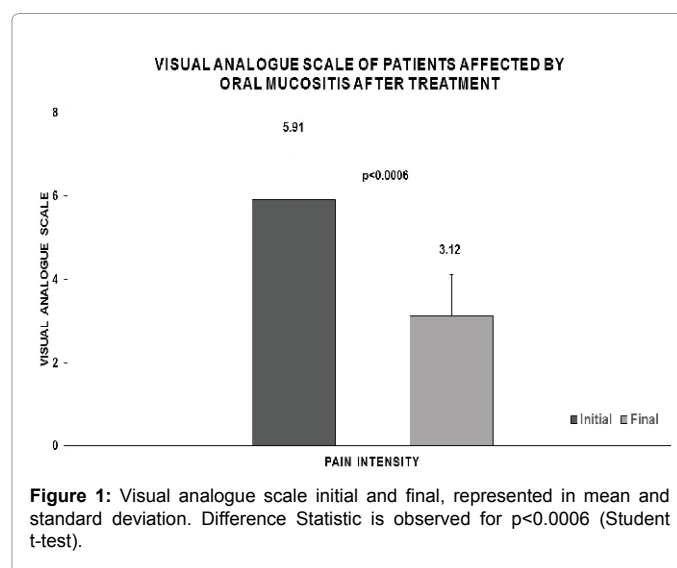


Figure 1: Visual analogue scale initial and final, represented in mean and standard deviation. Difference Statistic is observed for $p < 0.0006$ (Student t-test).

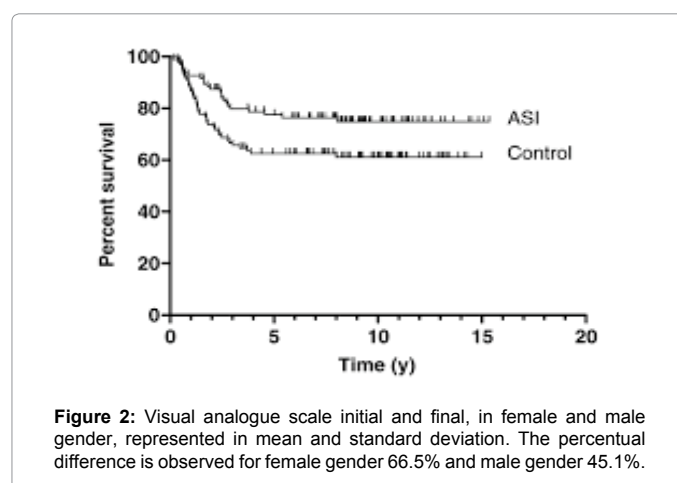


Figure 2: Visual analogue scale initial and final, in female and male gender, represented in mean and standard deviation. The percentual difference is observed for female gender 66.5% and male gender 45.1%.

Variables	Total	Average Sessions by Region
Head and neck neoplasm	22	8.2
Trunk neoplasm	1	12
Neoplasm in other locations	1	3
Total of patients	24	-
Total of sessions	195	-

Table 1: Types of neoplasm found in patients.

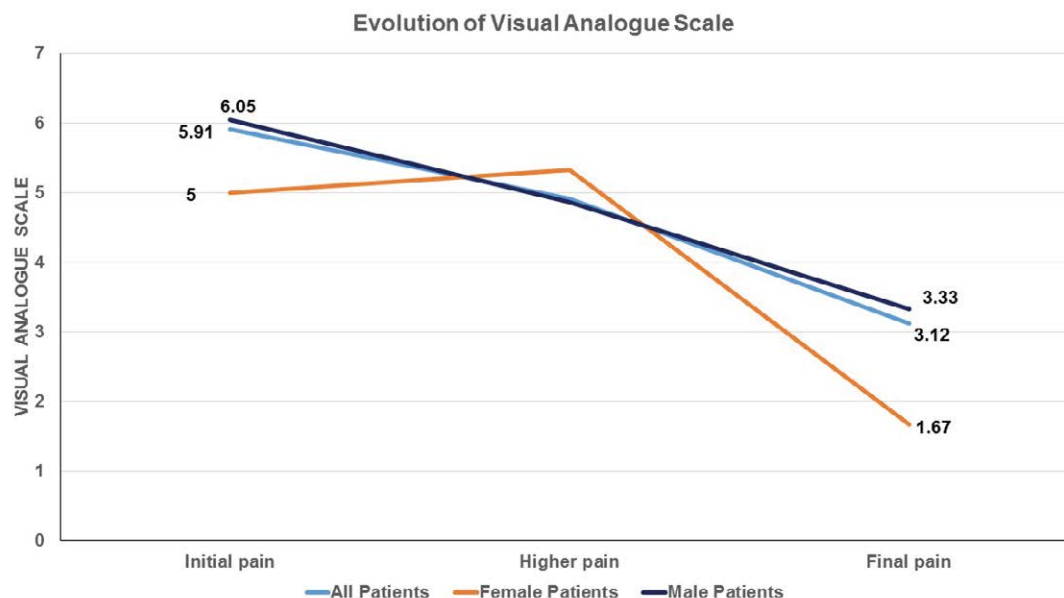


Figure 3: Evolution of visual analogue scale, in female and male gender, represented in initial and final values. The percentual difference is observed for female gender 66.5% and male gender 45.1%.

Conclusion

The constant technological advancement in the health area increasingly benefits the treatment and cure of diseases. The use of the low intensity laser for therapeutic purposes is in constant development for the treatment of several diseases, as well as for the improvement of the quality of life of patients affected by various diseases. In our work, photonic technology proved efficiency in the treatment of oral mucositis lesions due to chemo and radiotherapeutic procedures, seeking to reduce them due to superior anti-inflammatory, analgesic, biomodulating and healing properties. In this way, there is the favoring of the oncological patient's pain relief, as well as the possibility of its nutrition, providing not only the improvement of the quality of life, but the dignity necessary during the neoplastic treatment phase.

References

1. He M, Zhang B, Shen N, Wu N, Sun J (2008) A systematic review and meta-analysis of the effect of low-level laser therapy (LLLT) on chemotherapy-induced oral mucositis in pediatric and young patients. *Eur J Pediatr* 177: 7-17.
2. Peterson DE (1999) Research advances in oral mucositis. *Curr Opin Oncol* 11: 261-266.
3. Lopes LD, Rodrigues AB, Brasil DRM, Moreira MMC, Amaral JG, et al. (2016) Prevention and treatment of mucositis at an oncology outpatient clinic: A collective construction. *Texto & Contexto - Enfermagem* p. 25.
4. Rodrigues AMR (2003) Clinical evolution of oral mucositis using mouthwash and low intensity laser. Dissertation (Master in Dentistry) - School of Dentistry, Pontifical Catholic University of Minas Gerais, Belo Horizonte.
5. Volpato LE, Silva TC, Oliveira TM, Sakai VT, Machado MA (2007) Radioation therapy and chemotherapy-induced oral mucositis. *Rev Bras Otorrinolaringol* 73: 562-568.
6. <http://www1.inca.gov.br/estimativa/2018/>
7. Alencar ARP (2011) Treatment of oral and chemoinduced oral mucositis: comparison between conventional drug protocol and low intensity laser treatment. Dissertation (Master of Science) - Institute for Energy and Nuclear Research, São Paulo, Brazil.
8. Marín-Conde F, Castellanos-Cosano L, Pachón-Ibañez J, Serrera-Figallo MA, Gutiérrez-Pérez JL, et al. (2018) Photobiomodulation with low-level laser therapy reduces oral mucositis caused by head and neck radio-chemotherapy: Prospective randomizes controlled trial. *Int J Oral Maxillofac Surg* 48: 917-923.
9. De Aquino AE, De Castro CA, Ana da Silva K, Carbinatto FM, Anibal FF, et al. (2016) Low-level laser therapy promotes decrease in inflammatory process in obese trained rats. *Community Med Health* 6: 414.