LASER THERAPY IN THE TREATMENT OF ORAL MUCOSITIS IN ONCOLOGY PATIENTS

LASERTERPIA NO TRATAMENTO DE MUCOSITE ORAL EM PACIENTES ONCOLÓGICOS

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RESUMO

Introdução: A mucosite oral acomete entre 89% e 97% dos pacientes usuários de quimioterapia e radioterapia como tratamento para neoplasias malignas, apresentando o potencial de interferir diretamente no bem-estar do paciente. Entretanto, o uso da laserterapia de baixa potência tem se mostrado o tratamento mais adequado para a mucosite oral, atuando por meio de processos fotofísicos e bioquímicos que aumentam o metabolismo celular, estimulando a atividade mitocondrial, agindo como agente analgésico, anti-inflamatório e reparador da lesão mucosa. **Objetivos:** Este estudo tem como objetivo analisar a eficácia do laser de baixa intensidade na prevenção e tratamento da mucosite oral em pacientes expostos à radioterapia e quimioterapia na região de cabeça e pescoço. **Materiais e Métodos:** Trata-se de uma revisão descritiva/narrativa da literatura, na qual foram pesquisadas as bases de dados SciELO, LILACS, Pubmed e Medline. Foram utilizados os seguintes descritores: Mucosite oral; Laserterapia; Radioterapia; Quimioterapia. **Resultados:** Os estudos mostraram que, na maioria dos pacientes que foram submetidos profilaticamente a sessões de laserterapia antes do tratamento antineoplásico, não houve desenvolvimento de lesões na mucosa ou, quando desenvolvidas, a mucosite foi leve, não alterando o bem-estar do paciente. **Conclusão:** O laser de baixa potência é um importante aliado ao tratamento antineoplásico.

Palavras-Chave: Mucosite Oral; Laserterapia; Radioterapia; Quimioterapia.

ABSTRACT

Introductiona: The oral mucositis affects between 89% and 97% of the patients that are users of chemotherapy and radiotherapy as treatment for malignant neoplasms, presenting the potential to interfere directly in the patient's well-being. However, the use of low-power laser therapy has proven to be the most appropriate treatment for oral mucositis, acting through photophysical and biochemical processes that increase cellular metabolism, stimulating mitochondrial activity, acting as an analgesic, anti-inflammatory and repairing agent of the mucosal lesion. **Objective:** This study aims to analyze the efficacy of low intensity laser in the prevention and treatment of oral mucositis in patients exposed to radiotherapy and chemotherapy in the head and neck region. **Materials and Methods:** This is a descriptive/narrative literature review, in which the SciELO, LILACS, Pubmed and Medline databases were searched. The following descriptors were used: Oral mucositis; Laser therapy; Radiotherapy; Chemotherapy. **Results:** The studies showed that in most patients who were prophylactically submitted to laser therapy sessions prior to the antineoplastic treatment, there was no development of lesions on the mucosa or when developed, the mucositis was mild, not

altering the patient's well-being. **Conclusion:** The low-power laser is an important ally in antineoplastic treatment.

KEY WORDS: Oral mucositis; Laser therapy; Radiotherapy; Chemotherapy.

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INTRODUCTION

Oral mucositis is an inflammatory process in the oral cavity, initially characterized by an erythematous area which may evolve to ulceration, resulting in intense pain, discomfort, and increased risk of malnutrition of the patient. Chemotherapy and radiotherapy used in the treatment of head and neck cancer, besides suppression of the immune system caused by malignant neoplasms are influencing factors for oral mucositis[1].

Despite the benefits offered, radiotherapy and chemotherapy are unable to differentiate tumor cells from normal cells with a high rate of cell multiplication, such as the cells of the oral epithelium, thus establishing mucositis. The dental surgeon should seek knowledge in complementary therapies that can bring greater comfort to the patient[2].

Low-power laser therapy has been used for over 40 years to treat injured tissue, induce cell proliferation, and reduce pain. It acts directly on the permeability of the cell membrane, facilitating ionic mobility (calcium, sodium, and potassium) and indirectly increasing ATP production, since the energy released by ATP hydrolysis will promote the proper functioning of the sodium and potassium pump and improve cell metabolism[3]. As a result, the low-power laser has clinical healing, analgesic and biomodulation effects on inflammation; or even an antimicrobial effect when associated with photosensitive agents and can treat infections. Currently, laser is a technology that has become a desirable and inseparable alternative to many traditional procedures in clinical practice[4,5]. The objective of this study is to present a narrative and descriptive literature review, presenting the applicability of laser therapy for oral mucositis in cancer patients.

MATERIALS AND METHODS

The present study is a descriptive and narrative literature review. Database publications such as SciELO, LILACS, PubMed, and Medline were consulted, and evaluated oncologic treatment, the effects of antineoplastic therapies, the development of oral mucositis, and its treatment with laser therapy. As for the descriptors, the keywords were used: Radiation Treatment; Chemotherapy; Oral Mucositis, and Laser Therapy. Studies were analyzed from 2012 to 2022, in Portuguese and English. Original articles were used, as integrative and systematic studies, and case reports that presented scientific relevance regarding oral mucositis resulting from cancer treatment, as well as the use of laser therapy in these lesions and its effectiveness.

LITERATURE REVIEW

Oral Cancer

The mouth is an area of easy access for patients, physicians, and dentists, considering that any alteration in this region may be easily perceived, which should result in early diagnosis of any lesion at an early stage6. Oral cancer is among the most frequent cancers, despite being one of the few types of cancer where it is possible to perform self-examination. In Brazil, it is the fifth most common type of cancer among men and ninth among women. Therefore, there is an increasing need to engage the dental surgeon in the systematic orientation of patients on ways to prevent and quickly detect the signs and symptoms of oral cancer[7].

The prevention and diagnosis of oral malignant neoplasms, at the right time, are the most efficient measures of cancer prognosis.

Therefore, early diagnosis could be less difficult since the groups at higher risk are well known and easily accessible. Furthermore, preventive actions are necessary because of the potential effects of smoking and elitism, which are very present in young people[8]. Patients are generally unaware of the preventive examination and the dentist's ability to perform it; however, they seem receptive to the idea that the professional can conduct an examination that leads to early cancer diagnosis[9]. The alcohol, on the other hand, facilitates the dissolution of the components present in cigarettes, leaving them in high concentrations. On the other hand, alcoholism alone is considerably less common as an etiology of oral carcinoma; however, associated with smoking, it is the most common etiology. However, factors such as sun exposure and HPV are associated[10].

Secondary prevention aims at early diagnosis of the disease in its initial stage, even before any clinical complaint, therefore allowing a better prognosis and higher rate of cure. The dental surgeon is expected to play a key role in the prevention and diagnosis of the disease, thus helping in the instruction of self-examination using non-formal education strategies to achieve their goals[11,12].

Tertiary prevention aims to limit damage, control pain, prevent secondary complications, improve quality of life during treatment, and potentially reintegrate the individual into society, enabling him/her to perform activities prior to the disease[11].

Oral cancer may manifest itself in several ways. Usually, in its initial phase it is asymptomatic, in the form of leukoplastic, erythroblastic and leucoerythroblastic lesions. Exophytic or endophytic ulcers represent the main form of fundamental lesion for clinical diagnosis. In its advanced form, it may manifest symptomatically, with an extensive base and the presence of a consistent, nodular mass. The most affected anatomical areas are the lips, oral cavity (jugal mucosa, gums, hard palate, tongue, and mouth floor), oropharynx (tonsils, soft palate and base of tongue), trigon retromolar, vallecula, palatine tonsils and posterior and lateral walls of the oropharynx[13].

Antineoplastic Therapy

The choice of treatment, whether surgery, chemotherapy, hormone therapy or radiotherapy, depends on the individual characteristics of the patient, the type and stage of the tumor. Chemotherapy consists of the use of antineoplastic drugs with the purpose of inhibiting the proliferation of cancerous cells and preventing their dissemination in the organism. These drugs are used alone or in association, as these drugs present different mechanisms of action in the organism, and can be used as main curative treatment, adjuvant, neoadjuvant, palliative or in association with other therapies. Generally, chemotherapy for oral cancer is suitable for advanced tumors whose resectability is questioned or present relapse or dissemination pathology, preventing the growth of micro metastases[14].

They are generally cytostatic or cytotoxic in nature to prevent malignant cells from dividing rapidly and/or destroying themselves in the process. Although it is not an isolated treatment for head and neck tumors, it can be used before surgery (induction) and together with radiotherapy post-surgery (radiation and chemotherapy), or both[15].

The use of radiotherapy in the treatment of oral cancer includes several technical possibilities for the use of ionizing radiation beams with the objective of destroying cancer cells in a specific area. Increasingly, advanced techniques are used to offer better treatment, allowing increased dose to the tumor whilst maintaining limited dose to adjacent tissues (stereotactic radiotherapy). However, even with the advances, there is no technique that is 100% directed to the tumor area, thus totally avoiding the effects on the adjacent tissues[16].

Before head and neck radiotherapy or chemotherapy begins, it is important to consult a dentist beforehand to make patients more comfortable. This measure aims at facing possible problems generated by oncologic treatments, since this antineoplastic treatment aims at inhibiting cell division, acting on neoplastic cells and it also affects normal cells, including those of the oral mucosa[2,17].

Effects of Antineoplastic Therapy and measures for prevention

The side effects are notorious, both during and after the treatment. The oral cavity often presents manifestations such as xerostomia,

mucositis, candidiasis, osteoradionecrosis, osteonecrosis, and radiation caries[18].

One of the manifestations resulting from radiotherapy treatment is osteoradionecrosis of the jaws, which is described as an exposure of devitalized bone through an opening in the skin or in the mucosa itself. Treatment depends on the presence or absence of inflammation and/or infection, and conservative therapy is the most indicated, through irrigation with antimicrobial solutions, administration of antibiotics and sequestrectomies[19]. The mechanism by which it occurs is still controversial; however, it is known that the inhibition of osteoclast activity, and consequently the decrease in the potential for bone remodeling, leads to necrosis. Furthermore, with the prevention of antiangiogenic activity there is a decrease in vascular supply, which may cause ischemia, leading to tissue necrosis[20].

The decrease in salivary flow is another factor that should be analyzed in this phase, since saliva acts in the lubrication and protection of the dental elements through the buffer effect and its reduction can also make the mouth a suitable site for the development of candidiasis. Artificial saliva should be prescribed when decreased flow is observed by mucosal dryness or saliva quantification. However, some patients prefer to constantly ingest water rather than artificial saliva[9,21].

As in radiotherapy, the patient must also be referred for dental evaluation prior to undergoing chemotherapy treatment. Dental procedures, in principle, are the most urgent or with eminent need of performance, thus, situations such as: treatment of possible infections; treatment of inflammations; removal of extensive dental caries; elimination of ill-fitting dental prostheses and possible trauma to the oral mucosa are prioritized, in addition to oral hygiene instructions and presence of side effects, such as loss of taste, dermatitis, trismus and infections[17].

Oral Mucositis

Oral mucositis may be defined as a change in the mucosa lining of the oral cavity that may occur during oncologic treatment. The clinical presentation of oral mucositis can manifest itself in different ways, ranging from redness of the mucosa (erythema) to the formation of small lesions and ulcers. The most used scale to assess the symptoms of oral mucositis is the World Health Organization (WHO) scale and assesses Grade 0 No oral mucositis; Grade 1 Erythema and soreness; Grade 2 Ulcers, able to eat solids; Grade 3 Ulcers, requires liquid diet (due to mucositis); Grade 4 Ulcers, alimentation not possible (due to mucositis)[22]. The association between radiotherapy and chemotherapy determines an important impact on the oral mucosa, with oral mucositis being reported in 89% of patients who received both types of treatment, 92% who received only radiotherapy in the head and neck region, against 22% of patients who received only chemotherapy[23].

In oral mucositis caused by chemotherapy, the signs are initially seen between the 3rd and 5th day after the start of treatment and reach their peak around 7 to 14 days later, with their course normally lasting around three weeks. Healing begins from day 14 if there is no infection. However, oral mucositis caused by radiotherapy lasts for at least two weeks after the end of radiotherapy[24].

The appearance of mucositis favors the development of local and systemic infections, since, as it is an ulcer, this change becomes an entryway for microorganisms. Moreover, because of the limitation of proper oral hygiene because of the discomfort caused by the inflammation, the patient becomes susceptible to alterations by opportunistic microorganisms, such as carious lesions[12].

This inflammation manifests itself clinically as erosive and/or ulcerative lesions, which may cause mild to severe pain, usually leading to a significant decrease in quality of life. This is because they have the potential to prolong hospitalization, influence the patient's nutritional status, increase the risk of infections, and increase the prescription of opioids. The inflammatory condition generates pain and discomfort, compromising speech, swallowing, and feeding, which may lead the patient to dehydration and malnutrition, leaving him/her even more debilitated[5].

Oral mucositis is currently described as a complex characterized by the occurrence of phases. The initiation phase happens because of the release of reactive oxygen ions in the tissue involved in response to chemotherapy and/or radiotherapy, causing tissue exposure

to these toxic agents leading to direct damage to cells, tissues, and blood vessels[12].

In the phase of positive regulation with generation of messengers, there is cell death of the basal epithelial layer and activation of factor kappa B (NF-kB), leading to generation of pro-inflammatory cytokines, which leads to tissue injury and cell apoptosis. In the signaling and amplification phases, numerous chemical mediators are released in response to factors that occur in the first phase, leading to a sequence of positive feedback loops capable of prolonging and amplifying tissue injury[25].

As these events occur only in the submucosa and basal epithelium, clinically the mucosal surface remains deceptively intact. The ulceration phase, characterized by a robust inflammatory infiltrate and bacterial colonization, is related to higher costs in cancer treatment, both due to the use of drugs and longer hospital stay. In the healing phase, cell differentiation and proliferation occur, resulting in the restoration of the integrity of the epithelium[26].

As for the classification of the development of oral mucositis, studies indicate that the condition of the site, such as lack of hygiene, directly interferes in this classification. That said, the literature reports four stages in the development of the lesion: [1]. whitening with intra and extracellular edema; 2. appearance of erythematous areas on the mucosa, besides dysphagia; [3]. detached superficial layers of the mucosa, with a reddish bed covered by serofibrinous pseudo membrane; [4]. And when the erythematous or pseudo membrane areas are not recovered in time, there is loss of the mucosal lining, with increased pain, besides possible fever, with the need to interrupt antineoplastic therapy[27].

Low power laser therapy and its properties

One of the therapeutic alternatives for oral mucositis is laser therapy, which has been investigated by clinical trials for 28 years. Its mechanism is the photostimulation of chromophores that induces increased production of mitochondrial adenosine triphosphatases of the cells of the oral mucosa, thus increasing cell metabolism. It is a type of non-invasive treatment, in which one can modulate the energy density or fluence, which is expressed in Joules (J) over the area in cm². The tissue absorption of light depends on the density of the tissue, its hardness, malleability, and pigmentation[28].

Several studies have shown that the treatment and prevention performed with low-intensity laser has good results both clinically and functionally, by reducing pain, reducing the severity of oral mucositis, maintaining the integrity of the mucosa and accelerating healing because of the anti-inflammatory effect[29].

Lasers can be classified into two types: the high-power or surgical laser, which has cutting, vaporization, hemostasis, and coagulation effects, and the low-power or therapeutic laser, which is more widely used in therapy because it has analgesic, anti-inflammatory, biostimulation and healing properties. Therapy with low intensity laser, must follow the following parameters: choice of wavelength, energy density, power density, the type of laser operating regime, pulse frequency, number of sessions, optical characteristics of the tissue, such as absorption and scattering coefficients[30].

They cause several biological events, like epithelial and fibroblast proliferation, as well as their maturation, locomotion, and transformation into myofibroblasts. There are also cellular and vascular alterations that depend, among other factors, on the laser wavelength[27,31].

The light used can generally be in the spectrum of red or infrared light and is frequently applied to the lesion for 30 seconds to a few minutes or more, a few times a week for several weeks. As for the wavelength, the laser can be red (606 nanometers) or infrared (808 nanometers), thus defining the depth of penetration. The red laser promotes analgesia, accelerates healing and has antimicrobial action with the association of photosensitive agents. On the other hand, the infrared laser favors the elimination of the edema, responsible for increasing circulation, stimulates the immune system with analgesic and anti-inflammatory action, increases the permeability of the cell membrane, promotes the repair of bone and nerve tissues and has fibrinolytic action[32,33].

The absorption of light by a photoabsorber in a cell leads to physical or chemical changes in molecules present there, and consequently

positive biological responses can be observed. These photoabsorbers, called chromophores or photoreceptors, consist of a group of interrelated molecules that can be enzymes, cell membranes or any other extracellular substances that can absorb light at a certain wavelength, even if they are not specialized for that purpose[34].

Even though the benefits of using laser in wound treatment have been proven, the effectiveness of the use of low power laser as a therapeutic proposal depends on the wavelength used, power, dose, form of application, time of application, number of sessions, among other factors[35]. However, there is no specific protocol for professionals to safely follow this resource, revealing the need for further research in this area with the goal of exploring the method, better understanding of its application and its benefits, to validate and standardize its use in tissue repair[36].

RESULTS AND DISCUSSION

Based on the articles studied, the laser therapy protocol and the outcome of the studies applied in the research were separated individually and organized in a table. It contributed to the review of some elements, such as the potential of laser therapy in reducing the clinical manifestations of oral mucositis; preventive relevance, the need for further studies to define the protocol of action and a satisfactory prognosis. The results can be seen in Table 1.

Table 1. Laser therapy protocols and results found in research.

AUTHOR	PROTOCOLS (Laser parameters applied)	Outcome
Dantas et al.[37]	InGaAlP diode laser, with a maximum output power of 86.7 mW, an active tip area of 0.1256 cm² and a continuous wavelength of 660 nm, was used. The dosimetry used in each application was 2 J for 3 seconds, totalling 56 J. Twenty -eight equidistant laser application points were delineated, with a safety margin of 5 cm from the tumour. Applied areas: lips, jugal mucosa, hard and soft palate, floor of the mouth/sublingual gland, lateral border of the tongue and dorsum of the tongue. The first session was carried out on the first day of radiotherapy and subsequent sessions were carried out on alternate days every week, immediately before the administration of each fraction.	It was not effective in preventing oral mucositis, salivary stimulation, or pain management in patients with oral cavity cancer undergoing radiochemotherapy in the head and neck region. However, the severity of oral mucositis was reduced in patients who un derwent laser therapy compared to patients who did not.
Guimarães et al.[38]	Wavelength of 660nm, in Continuous wave, 0.6 J of energy per point, 6 points per area, with exposure of 36 seconds per area. Total energy per area of 3.6 J. Seven a pplied areas: bilateral buccal mucosa, upper and lower labial mucosa, lateral and ventral surface of the tongue and floor of the mouth. The applications once a day at approximately the same time, starting on D0 of the chemotherapy cycle and ending until discharge home.	The laser had a positive effect in preventing oral mucositis caused by high doses of methotrexate.
Kuhn-Dall'Magro et al.[39]	Per group: G1 received a 660nm (red) laser, with 100 mW and 6 J/cm², G2 received the 810 nm laser (infrared) adjusted to 100 mW and 6 J/cm² . G3, lasers with 660 nm (red) + 810 nm (infrared) were applied simultaneously, with 100 mW and 6 J/cm². The application period was 42 days for each patient. Laser applications were made to sites affected by mucositis.	The group in which the red and infrared lasers were applied in combination had lower Oral Mucositis scores, showing that this combined protocol may offer advantages over the groups in which the lasers were applied alone.
Legouté et al.[40]	He-Ne laser (lambda = 658nm, output=100mW and energy density=4J/cm2). All anatomical sites with moderate or severe oral mucositis (WHO scale grade≥2) were treated daily after the radiotherapy session, as recommended: 40 s per 1cm2 site to achieve 4 J/cm2.	Laser photobiomodulation was well tolerated with a good safety profile for the patients treated.

Martins et al.[41]	InGaAlP diode laser , wavelength of 660 nm (red laser), power of 25 mW, in continuous mode. The energy density was 6.2 J/cm2 for 10 seconds; energy of approximately 0.25J was deposited in each spot. The total energy per day was approximately 15.25J. The laser beam was applied punctually and perpendicularly in contact with the oral mucosa. Applied area: right and left buccal mucosa, upper and lower labial mucosa, hard palate, lateral surface of the tongue, soft palate, dorsum of the tongue, floor of the mouth and labial commissure. The irradiation for each point was 10 seconds and the distance between them was approximately 1 cm. The duration of each session was approximately 12 minutes.	The laser was effective in preventing and controlling severe oral mucositis, and its mechanism of action may be related to a better balance of the inflammatory response, which may favour control of the lesion.
Ottaviani et al.[42]	**Wavelength 635 nm, frequency 2 Hz, power 2.5 mW, time 180 seconds, spot size 1 cm² and total energy 0.45 J in defocused mode. The laser application was repeated twice a day, 5 minutes apart, followed by a simplified questionnaire to assess swallowing, chewing and phonatory pain.**	**Swallowing, phonation and chewing abilities were completely recovered in 100% of patients under laser treatment. Also, altered voice, swallowing problems, altered lips, altered saliva, altered tongue, altered mucous membranes and problems in performing good oral hygiene decreased significantly after laser.**
Vitale et al.[43]	GaAlAs diode laser, 970 nm. The protocol was carried out once a day for four consecutive days and the parameters used were as follows: output power 3.2 W, duty cycle 50%, frequency 35 -6000 Hz, duration 230 s and spot size 1 cm, defocused mode. Applied areas: upper lip, lower lip, right and left sides of the tongue, right and left sides of the cheek, hard palate, soft palate and floor of the mouth. Ulcerated and erythematous areas were treated. Laser treatment was evenly applied to each intraoral lesion by th e sam e operator for four consecutive days.	All patients in the laser group showed improvement in painful sensation from the 3rd day after the first laser application, the ulcerations reduced in size and the erythema disappeared. In the laser group, all mucositis was completely resolved from the seventh day onwards.
Rozza-de-Menezes et al.[44]	Application to the upper and lower lip, tongue, soft palate, hard palate and floor of the mouth. Wavelength 660nm. Oral mucositis was assessed on the 7th and 14th day.	Lower frequency and intensity of oral mucositis was observed in the laser group.
Rupel et al.[45]	Gallium arsenide (GaAs) diode laser + indium gallium arsenide aluminium phosphide (InGaAlAsP) laser device treated at T0, T1, T2 and T3 using a previously optimised protocol (λ 970 nm, 200 mW/cm2, 6J/cm2, in continuous wave). It was delivered using a rotating movement throughout the oral cavity to cover ulcerated and healthy areas, maintaining 3 cm between the laser probe and the tissue. The irradiation time was calculated considering an average surface area of the oral mucosa of 215 cm2.	The effectiveness of the laser was confirmed by the progressive reduction in pain. In addition, the number of patients who reported discomfort in subjective parameters (swallowing, chewing, and speaking) also decreased over time after laser photobiomodulation.
Tomaževič et al.[46]	Per group: Three groups with different laser settings (group A: power 250 mW, energy density 8.8 and 15.5 J/cm2 for WHO grades 3 and 4 respectively; group B: power 500 mW, energy density the same as group A; group C: power 250 mW, energy density was half that of groups A and B). Laser application in patients with Oral Mucositis with WHO classification 3 or 4 was randomly distributed in and was carried out on all lesioned areas.	The average number of laser sessions to reduce from severe mucositis to mild mucositis or no mucositis was 3.8 in group A, 4.4 in group B and 4.0 in group C, with not statistically significant between the three study groups,

According to the literature studied, Oral Cancer is considered one of the most common neoplastic alterations, thus requiring mastery in early intervention by the professionals involved. This is because the dental surgeon's intervention regarding the detection of possible alterations makes possible a less invasive treatment with a better prognosis7. However, in clinical practice there is a high number of patients who do not adopt such measures. Most patients do not know that the dental surgeon can perform preventive examinations; however, they are open to clinical management[9].

The determination of the therapy applied is directly associated with the patient's individual condition, and it can be surgical, chemotherapeutic, radiotherapeutic or associated. Therefore, the literature states the

importance of preventive dental appointments before the beginning of the therapy, since changes such as xerostomia, mucositis, candidiasis, osteoradionecrosis, and caries by radiation are presented as a reflex of the absence of dental appointments before the oncologic therapies[21].

Studies have certified that approximately 89% of patients treated with chemotherapy and radiotherapy presented oral mucositis as a manifestation; on the other hand, 22% of those submitted to chemotherapy alone also developed oral mucositis. However, there is a difference in the intensity of oral mucositis according to age, since younger patients have a greater speed in cell division, as well as a shorter recovery time[23].

Regarding the therapy applied, there are options ranging from drug therapy to laser applications and antimicrobial photodynamic therapy. However, studies state that oral mucositis symptoms do not improve significantly with any medication; however, laser therapy and cryotherapy have consolidated their efficiency[24,45].

Accordingly, studies state that mucositis lesions are considerably reduced. Moreover, compared to those who do not use laser therapy, the patients who use it show an increase in healing[1,3,12,17,27-28,30,35-36].

Other studies show that, in addition to its therapeutic application, the low-intensity laser shows excellent results in the preventive field. We can list the significant effects on pain reduction, as a reflection of the reduction in the severity of mucositis, and the acceleration of healing due to the anti-inflammatory effect, considering some factors, including the wavelength[29].

The wavelength is related to the depth of penetration: the red laser with 606 nanometers, and the infrared with 808 nanometers. Their purposes are different due to their properties: the red laser promotes analgesia, accelerates healing, and acts in the antimicrobial action, while the infrared laser favors the elimination of edema and analgesic and anti-inflammatory action[33].

Laser therapy before antineoplastic treatment has shown to be effective in the prevention of oral mucositis as well as in the treatment of lesions, since with the intervention there is a reduction in the frequency and degree of lesions 38-47, besides a decrease of up to 75% in the use of analgesics and improvement of swallowing in up to 100% of the cases[12,17].

However, studies with a larger sample size are needed for better evaluation of the prophylactic effect of oral mucositis grade > 3 by laser therapy, reflecting the importance of knowledge about the ideal protocol to be used[27,35].

CONCLUSION

Thus, we understand that the use of low-intensity laser therapy is an effective, non-invasive technique, which is used favorably both in preventive and curative treatments, allowing us to improve the quality of life of patients. Moreover, the intervention with laser therapy in oral mucositis has a potential of up to 100% in the improvement of feeding. It is understood that future studies should approach perspectives related to intervening in the factors associated with the most prevalent etiology. As well as, understanding which factors lead the individual to become more vulnerable to these problems. In this context, it is understood that it is necessary to plan preventive actions in the diagnosis of cancer. Since, if the disease is not diagnosed early, it will result in the invasion of neighboring structures and the formation of metastases. Although chemotherapy is more invasive, radiotherapy has a greater influence as it is the most widely used treatment for head and neck neoplasms. Moreover, it is essential that the dental surgeon invests in knowledge to work with laser therapy, providing new ways for an innovative and quality care.

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