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ORIGINAL

# Effectiveness of laser therapy in patients over 19 years of age with a diagnosis of alveolitis

## Efectividad de la laserterapia en pacientes mayores de 19 años con diagnóstico de alveolitis

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## ABSTRACT

**Introduction:** alveolitis or alveolar osteitis is the most frequent and painful postoperative complication in dentistry. Its appearance is generally associated with the absence of a blood clot inside the socket after tooth extraction.
**Objective:** to evaluate the effectiveness of laser therapy in the treatment of alveolitis in patients over 19 years of age.
**Method:** a descriptive, prospective, longitudinal study of cases and controls was carried out in the dentistry service of the "Abel Santamaría Cuadrado" General Teaching Hospital in the period October 2022-September 2023. The universe was made up of 550; the entire of the patients over 19 years of age in this service, the sample consisted of 76 patients, obtained through simple random sampling and according to the exclusion and inclusion criteria. The sample was divided into two groups: Group I (study) made up of patients to whom laser therapy with anti-inflammatory and analgesic parameters was applied for 4 minutes and Group II to which conventional treatment, curettage or alveolar curettage and application from Alvogyl.
**Results:** there was a predominance of the group of 41-50 years, with 33 patients for 43,5 %. The risk of the appearance of alveolitis after an extraction increases with age, due to the decrease in the vascular supply of the bone. It was observed that the population studied according to sex showed a predominance of the male sex with 43 for 56,6 %. The effectiveness of the treatment in curing dry socket is observed where the study group was more effective than the control group with 39 patients for 95,12 %.
**Conclusions:** prior preventive care, professional care during extraction and post-extraction treatment will always be vital, elements to consider avoiding alveolitis, regardless of the type that occurs, according to the classification.

**Keywords:** Alveolitis; Tooth Extraction; Laser Therapy; Stomatological Urgency.

## RESUMEN

**Introducción:** la alveolitis u osteítis alveolar es la complicación postoperatoria más frecuente y dolorosa en la odontología, por lo general, su aparición está asociada a la ausencia del coágulo de sangre en el interior del alveolo luego de la extracción dental.
**Objetivo:** evaluar la efectividad de la laserterapia en el tratamiento de la alveolitis en pacientes mayores de 19 años.
**Método:** se realizó un estudio descriptivo, prospectivo, de corte longitudinal de casos y controles en el

servicio estomatológico del Hospital General Docente "Abel Santamaría Cuadrado" en el período octubre de 2022-septiembre de 2023. El universo estuvo integrado por 550, la totalidad de los pacientes mayores de 19 años de este servicio, la muestra por 76 pacientes, obtenida mediante muestreo aleatorio simple y según los criterios de exclusión e inclusión. La muestra fue dividida en dos grupos: Grupo I (estudio) integrado por los pacientes a los que se les aplicó laserterapia con parámetro antiinflamatorio y analgésico por 4 minutos y Grupo II al que se le aplicó el tratamiento convencional, legrado o curetaje alveolar y aplicación de Alvogyl. **Resultados:** existió un predominio del grupo de 41-50 años, con 33 pacientes para un 43,5 %. El riesgo de la aparición de una alveolitis luego de una exodoncia aumenta con la edad, debido a la disminución del aporte vascular del hueso. Se observó que la población estudiada según el sexo, mostró un predominio del sexo masculino con 43 para un 56,6 %. Se observa la efectividad del tratamiento en la cura de la alveolitis donde el grupo de estudio fue más efectivo que el grupo de control con 39 pacientes para un 95,12 %.
**Conclusiones:** siempre serán vitales los cuidados preventivos previos, el cuidado del profesional durante la extracción y el tratamiento pos-extracción, elementos a considerar para evitar una alveolitis, más allá del tipo que se presente, según la clasificación.

**Palabras clave:** Alveolitis; Extracción Dental; Laserterapia; Urgencia Estomatológica.

## INTRODUCTION

Alveolitis or alveolar osteitis is a local, painful, and reversible complication of tooth extraction. It occurs late, 2 to 4 days after extraction. It usually lasts about ten to fifteen days, with or without treatment. It is the most frequent complication of tooth extraction and the most common cause of pain in the postoperative period in emergency dental clinics.[1]

Through medical history and clinical examination, we arrive at a diagnosis, which can be confirmed by passing a curette into the dry socket and finding bare, hypersensitive bone or a malformed clot that, when irrigated and displaced, reveals bare, very sensitive walls.[2]

In an attempt to explain the etiopathogenesis of this condition, some authors consider its origin to be multifactorial due to the influence of both systemic and local factors that increase its frequency. The factors involved in its presentation are grouped into general and regional factors, including age, nutritional status, and systemic diseases.[3]

Clinically, the condition can be described as an alveolus where the primary blood clot has necrotized and remains within the alveolus as a septic foreign body. This usually occurs a few days after extraction, when the alveolar walls are left without protective covering. The exposed bone is accompanied by intense pain, which can be controlled with the local application of strong analgesics and oral or parenteral analgesics or antibiotics.[3]

**It is generally classified as:**[4]

*Wet alveolitis:*

The blood clot undergoes degeneration and infection, is dark brown and has a foul odor due to the decomposing organic material.

*Dry alveolitis*:

Occurs in an alveolus, and obtaining a stable blood clot with exposure to the alveolar bone tissue is impossible.

It is most commonly found in the lower jaw, with the molars and premolars being the most affected alveoli. It is more common in females and, in terms of age, infrequent in children, with most cases occurring between the third and fourth decades of life. This condition is one of the oral events to be monitored by the oral health surveillance system through sentinel sites.[4]

Managing alveolitis is a dilemma, as its specific cause is unknown. The main objective of alveolitis treatment is pain management and infection control, as well as aiding in the healing of the alveolus. Several studies have been conducted to define the treatment of alveolitis, which can be local or systemic.[5]

Advances in research and clinical studies have led to developing technologies for scientific or industrial purposes that ultimately serve the health sector. One such technology is the laser, which was developed several decades ago but has only been used clinically in medicine for approximately 20 years.[6]

"LASER" is an acronym for "Light Amplification by the Stimulated Emission of Radiation." The use of laser technology in dentistry has undergone constant evolution and development over the last 20 years. There are two main groups of lasers: high-power or surgical and low-power or therapeutic.[7]

Therapeutic lasers are indicated for various conditions such as hypersensitivity, gingivitis, herpes, paresthesia, trigeminal neuralgia, trismus, TMJ dysfunction, implants, and activation of teeth whitening chemicals, among

others.[7]

In dentistry, it is used in different areas, mainly in oral and maxillofacial surgery to incise soft tissue and bone; in surgery for both caries removal and cavity shaping; in orthodontics for stimulation and acceleration of tooth movements; in periodontics, it is used in periodontal surgery as a complementary therapy to scaling and root planing, bacterial elimination, and more recently in regeneration therapy, which has been tested in in vitro studies on fibroblast cultures and animal models and is now in the initial phase of clinical trials. Although it is used in different specialties, all technical protocols regarding power and laser type are different, and there is no consensus on its widespread use.[8,9]

Considering the large number of patients who come to the clinic with alveolitis and based on studies conducted by various authors who used laser therapy as a treatment for different conditions, it was decided to conduct this research in the dentistry department of the Abel Santamaría Cuadrado General Teaching Hospital to evaluate the effectiveness of laser therapy in the treatment of alveolitis in patients over 19 years of age.

## METHOD

A descriptive, prospective, longitudinal case-control study was conducted in the dental service of the Abel Santamaría Cuadrado General Teaching Hospital between October 2022 and September 2023 on the effects of laser treatment on the healing of alveolitis.

The universe consisted of the population over 19 years of age belonging to the health area of the aforementioned dental service who presented with alveolitis. The sample was selected by the intentional non-probabilistic method and consisted of 76 patients.

*Inclusion criteria*

Patients with a clinical diagnosis of alveolitis.
Patients over 19 years of age are willing to participate in the study.
Patients with no contraindications for laser therapy.

*Exclusion criteria*

Patients under 19 years of age.
Patients with contraindications for laser therapy.
Patients who did not give their consent to participate in the study.

The variables analyzed were age (age groups: 20-30 years, 31-40 years, 41-50 years, 51-60 years, 61-70 years), sex, risk factors (traumatic extraction, smoking, diabetes mellitus, poor oral hygiene, and previous oral infections), time of evolution (third, fifth, seventh, and tenth day), treatment effectiveness (effective and ineffective), and adverse reactions (yes/no).

An in-depth study was conducted of various documents such as theses, scientific journals, publications, and other literature related to the topic under investigation, both nationally and internationally.

To characterize the sample to be treated according to sex and age, data were obtained through a survey of all patients who came to the emergency department. This consisted of patients aged 20 years and older who went to the emergency department for treatment of alveolitis, who were willing to participate in the study (informed consent), and met the inclusion criteria during the study period. The first group, or study group, was treated with laser therapy, and the second group, or control group, was treated with conventional methods (alveolar curettage and Alvogyl).

The research was conducted using ethical principles for research involving human subjects. The procedures and techniques used in the study were explained in detail to the patients, and informed consent was obtained from all patients. The objectives and importance of the study were presented to ensure effective treatment with laser therapy, taking into account the Declaration of Helsinki at all times.

## RESULTS

**Table 1.** Distribution of the sample according to age and treatment group

| Age | Group I | | Group II | | Total | |
|---|---|---|---|---|---|---|
| | No | % | No | % | No | % |
| 20-30 | 3 | 9,4 | 5 | 11,4 | 8 | 10,5 |
| 31-40 | 6 | 18,8 | 9 | 20,4 | 15 | 19,7 |
| 41-50 | 13 | 40,6 | 20 | 45,5 | 33 | 43,5 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 51-60 | 7 | 21,8 | 9 | 20,4 | 15 | 19,7 |
| 61-70 | 3 | 9,4 | 1 | 2,3 | 5 | 6,6 |
| Total | 32 | 100 | 44 | 100 | 76 | 100 |

The 41-50 age group was predominant, with 33 patients (43,5 %). The risk of alveolitis developing after tooth extraction increases with age due to decreased blood supply to the bone. (table 1)

The study population was predominantly male, with 43 males and 17 females (56,6 %). (table 2)

**Table 2.** Distribution of the population by sex

| Sex | Group I | | Group II | | Total | |
|---|---|---|---|---|---|---|
| | No | % | No | % | No | % |
| Male | 20 | 62,5 | 23 | 2,3 | 43 | 56,6 |
| Feminine | 12 | 37,5 | 21 | 47,7 | 33 | 43,4 |
| Total | 32 | 100 | 44 | 100 | 76 | 100 |

The predominant risk factor was previous oral infections, with 26 patients (31,70 %), of whom 12 belonged to the study group and 14 to the control group. The predominant risk factors are closely related to males' prevailing lack of concern. (table 3)

**Table 3.** Distribution of the population according to risk factors

| Risk factors | Group Estudio | | Group Control | | Total | |
|---|---|---|---|---|---|---|
| | No | % | No | % | No | % |
| Traumatic extractions | 3 | 9,4 | 5 | 11,3 | 8 | 10,5 |
| Smoker | 6 | 18,7 | 10 | 22,7 | 16 | 21,1 |
| Poor oral higiene | 10 | 31,3 | 14 | 31,8 | 24 | 31,6 |
| Previous oral infections | 9 | 28,1 | 12 | 27,2 | 21 | 27,6 |
| Diabetes Mellitus | 4 | 12,5 | 3 | 6,8 | 7 | 9,2 |
| Total | 32 | 100 | 44 | 100 | 76 | 100 |

Regarding the influence of laser on pain relief according to treatment duration, it was observed that on the third day of treatment, 16 patients in the study group showed favorable progress (39,02 %), compared to only 9 in the control group (21,95 %). (table 4)

**Table 4.** Influence of laser on pain relief according to time of evolution

| Time of evolution | Group Study | | Group Control | |
|---|---|---|---|---|
| | No | % | No | % |
| 3er day | 16 | 39,02 | 9 | 21,95 |
| 5to day | 10 | 24,39 | 14 | 34,14 |
| 7mo day | 8 | 19,51 | 10 | 24,39 |
| 10mo day | 7 | 17,07 | 8 | 19,51 |
| Total | 41 | 100 | 41 | 100 |

The effectiveness of treatment in curing alveolitis indicated that the study group was more effective than the control group, with 39 patients (95,12 %). (table 5)

**Table 5.** Effectiveness of treatment in curing alveolitis

| Effectiveness | Group Study | | Group Control | |
|---|---|---|---|---|
| | No | % | No | % |
| Cash | 39 | 95,12 | 37 | 90,24 |
| No Cash | 2 | 4,87 | 4 | 9,75 |
| Total | 41 | 100 | 41 | 100 |

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## DISCUSSION

This study showed similarities with León V et al. [10] in which the 35-59 age group was the most affected. In the vast majority of studies conducted, females predominate due to the use of oral contraceptives or the presence of menstruation, when hormone levels peak.

González X et al.[11] suggest that with increasing age, there is an increased likelihood of developing alveolitis due to marked deterioration in oral health (teeth treated at an earlier age for caries or other processes or presenting lesions due to not attending the dentist regularly), which is generally accompanied by pain due to the damage present at the time.

Previous infection of the extracted tooth or its vicinity, or infection introduced into the alveolus after tooth extraction, can moderately influence the onset of dry alveolitis. However, many extractions are performed with infections or abscesses without presenting symptoms.[12, 13]

Jach M[2] shows in his research that more than half of patients with alveolar osteitis had pre-existing pulp pathology in 59,57 % of cases. These were followed by those extracted due to periodontal disease and pericoronitis, with 22,34 % and 11,70 %, respectively, which are considered statistically similar.

These results coincide with those obtained by Díaz R (14), where on the third day after treatment, 17 patients progressed favorably, representing 33,3 % of the study group, compared to 9 patients in the control group, representing 17,6 %, demonstrating the effectiveness of this therapy for the treatment of inflammatory processes.

In the study conducted by Díaz Couso Y [14] a higher percentage (78,4 %) of patients evaluated the treatment as effective in the study group compared to those who received Allvogyl (44,5 %).

In a study by Ricardo O et al. [15] comparing group A with group B, the effectiveness of laser therapy was demonstrated, with 97,6 % of patients obtaining total pain relief, compared with only 52,4 % of patients in group B.

Díaz Couso Y [14] reported in their study that 6,7 % of patients reported mild pain after treatment on the first visit. From the second visit onwards, a significant improvement in pain intensity was observed, with the third visit being the most important for patients without pain (86,7 %).

Notably, none of the patients treated with laser reported adverse effects such as pain, burning, or redness in the area. In general, laser therapy produces minimal reactions in treating various pathologies, so it was necessary to study it in depth to confirm its safety for tissues and maintain pharmacovigilance in treating alveolitis in the study group.

These results are consistent with other studies showing that laser is a safe technique, as no adverse reactions were reported during the study, consistent with research published over more than 20 years.[14,15,16]

Based on the above arguments, and given the need to find new therapeutic options that are useful and easy to apply in clinical medicine, it was considered feasible to conduct a study that would take advantage of the benefits of laser therapy, as its analgesic and anti-inflammatory properties are necessary for patients suffering from this type of injury.

## CONCLUSIONS

According to the classification, preventive care before extraction, professional care during extraction, and post-extraction treatment will always be vital elements to avoid alveolitis, regardless of the type that presents.

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## CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

## AUTHOR CONTRIBUTION

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