BRAZILIAN JOURNAL OF IMPLANTOLOGY AND HEALTH SCIENCES

ISSN 2674-8169

Use of Vitamin C in the Mucosal Healing Process after Tooth Extractions

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https://doi.org/10.36557/2674-8169.2025v7n3p2052-2061
Artigo recebido em 17 de Fevereiro e publicado em 27 de Março de 2025

LITERATURE REVIEW

ABSTRACT

Objective: This study aims to evaluate the role of Vitamin C in the healing process of the oral mucosa after tooth extractions, analyzing its biochemical mechanisms, clinical benefits, and potential interdisciplinary applications in healthcare. **Materials and Methods:** A systematic review of scientific literature was conducted using databases such as PubMed, Scielo, and BVS Bireme. Studies investigating the effects of Vitamin C on wound healing, collagen synthesis, angiogenesis, oxidative stress reduction, and its influence on periodontal health and post-extraction recovery were analyzed. In vitro and in vivo studies were included to provide a comprehensive overview of its biological and clinical implications. **Results:** The findings indicate that Vitamin C plays a crucial role in the post-extraction healing process by promoting collagen synthesis, enhancing angiogenesis, and reducing oxidative stress, leading to faster tissue repair. Its immunomodulatory properties also contribute to a lower incidence of infections and complications such as alveolitis. Additionally, its antioxidant action helps prevent cellular damage, while its remineralizing effect aids in maintaining periodontal and dental health. Studies also highlight its potential benefits in implant osseointegration and periodontal disease prevention, reinforcing its relevance in clinical dental practice. **Conclusion:** Vitamin C is a key element in optimizing oral tissue regeneration, offering multiple benefits that go beyond post-extraction healing. Its interdisciplinary approach, integrating dentistry with nutrition and medicine, enhances clinical outcomes and patient care. Considering its wide-ranging effects, further research and clinical protocols should be encouraged to maximize its application in dentistry.

Keywords: Ascorbic Acid; Wound Healing; Surgery, Oral.

Uso da Vitamina C no Processo de Cicatrização da Mucosa após Exodontias

RESUMO

Objetivo: Este estudo tem como objetivo avaliar o papel da vitamina C no processo de cicatrização da mucosa oral após extrações dentárias, analisando seus mecanismos bioquímicos, benefícios clínicos e potenciais aplicações interdisciplinares na área da saúde. **Materiais e métodos:** Uma revisão sistemática da literatura científica foi conduzida usando bancos de dados como PubMed, Scielo e BVS Bireme. Estudos que investigam os efeitos da vitamina C na cicatrização de feridas, síntese de colágeno, angiogênese, redução do estresse oxidativo e sua influência na saúde periodontal e recuperação pós-extração foram analisados. Estudos in vitro e in vivo foram incluídos para fornecer uma visão geral abrangente de suas implicações biológicas e clínicas. **Resultados:** Os achados indicam que a vitamina C desempenha um papel crucial no processo de cicatrização pós-extração, promovendo a síntese de colágeno, aumentando a angiogênese e reduzindo o estresse oxidativo, levando a um reparo tecidual mais rápido. Suas propriedades imunomoduladoras também contribuem para uma menor incidência de infecções e complicações como a alveolite. Além disso, sua ação antioxidante ajuda a prevenir danos celulares, enquanto seu efeito remineralizante auxilia na manutenção da saúde periodontal e dentária. Estudos também destacam seus potenciais benefícios na osseointegração de implantes e prevenção de doenças periodontais, reforçando sua relevância na prática clínica odontológica. **Conclusão:** A vitamina C é um elemento-chave na otimização da regeneração do tecido oral, oferecendo múltiplos benefícios que vão além da cicatrização pós-extração. Sua abordagem interdisciplinar, integrando odontologia com nutrição e medicina, melhora os resultados clínicos e o atendimento ao paciente. Considerando seus efeitos abrangentes, pesquisas e protocolos clínicos adicionais devem ser encorajados para maximizar sua aplicação na odontologia.

Palavras-chave: Ácido Ascórbico; Cicatrização; Cirurgia Bucal.

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INTRODUCTION

Health science has never been an isolated island. Between Dentistry, Medicine, Nutrition and Biomedicine, there is a network of interconnections that intertwine in the search for patient well-being. A fascinating example of this intersection is the influence of Vitamin C on the healing process of the oral mucosa after tooth extractions.

Imagine the following scene: a patient leaves the dentist's office after having a tooth removed and receives the classic post-operative recommendations. However, what is often overlooked is the fundamental role of micronutrients in tissue recovery. And this is where Vitamin C comes into play, not only as a supporting role, but as a protagonist in cell regeneration and collagen synthesis, an essential element for restructuring the oral mucosa (J Dethlefs-Canto et al., 2024).

From the times of sailors who feared scurvy to modern studies on biomaterials, Vitamin C has proven to be an indisputable ally in human health. Its active participation in the immune response and in the reduction of oxidative stress are factors that directly impact the time and quality of healing (Baron, 2009). But how can nutrition and dentistry work together in this process? And how can integration between different areas of health enhance clinical results?

An interdisciplinary approach is key to more effective and humanized care. The interaction between dentists, nutritionists and health professionals in general allows not only to optimize patient recovery, but also to develop more effective preventive and therapeutic strategies (Bendowska & Baum, 2023). In this context, understanding the mechanisms of action of Vitamin C and its influence on oral healing is essential to improving the quality of healthcare.

Therefore, by exploring the impact of this micronutrient on tissue repair, this article seeks to highlight not only the biochemical importance of Vitamin C, but also to emphasize how integration between different areas of health can transform clinical practice (Lykkesfeldt, 2020). It is time to rethink conventional approaches and include a broader and multidisciplinary approach to oral mucosa healing in the dental routine. After all, who would have thought that a simple nutrient could make all the difference in a patient's smile and recovery?

MATERIALS AND METHODS

During the development of this narrative review article, it was essential to establish a methodological strategy to ensure the inclusion of the most current, relevant, and scientifically validated information on the topic, providing robust and well-supported content. Searches were conducted across multiple databases, including DeCs, BVS/BIREME, PROSPERO, SciELO, PubMed Central, ScienceDirect, Web of Science, and The Cochrane Library, in conjunction with Google Scholar. Additionally, gray literature was utilized to provide supplementary and relevant insights, which proved crucial for a comprehensive exploration of the subject matter. To refine the scope and relevance of the searches, the following descriptors were employed: Ascorbic Acid, Wound Healing and Surgery, Oral. Given the narrative review format, it was necessary to adopt a framework that defines the structure, essential elements, and exclusions pertinent to this type of study. Consequently, Rother's (2007) work served as a methodological guide throughout the preparation of this article, ensuring consistency and adherence to the standards of narrative literature reviews.

RESULTS AND DISCUSSION

The results of the use of Vitamin C in dentistry demonstrate a significant impact

on healing and maintenance of oral homeostasis. Vitamin C acts as an essential cofactor in the enzymatic synthesis of collagen, a structural protein essential for the repair of damaged tissues after invasive surgical procedures, such as tooth extractions (Murererehe et al., 2022). As stated in the work of Politis et al., (2016) patients with adequate serum levels of this vitamin have an accelerated healing rate, with a lower incidence of postoperative complications, such as alveolitis, secondary infections and surgical wound dehiscence.

Vitamin C plays a key role in angiogenesis, promoting the proliferation and maturation of new blood vessels, optimizing tissue perfusion and ensuring an adequate supply of oxygen and nutrients to the surgical site (Barchitta et al., 2019). In addition, its potent antioxidant activity contributes to the neutralization of reactive oxygen species (ROS), reducing the deleterious impact of oxidative stress on regenerating tissues and preserving the integrity of epithelial and fibroblast cells (Jomová et al., 2023).

Another relevant factor is its ability to modulate the immune response, promoting an increase in the proliferation and functionality of immune system cells, such as macrophages and neutrophils (Chen et al., 2018). This property directly contributes to the reduction of the microbial load at the surgical site, minimizing the risk of bacterial and viral infections and favoring an efficient and uncomplicated tissue repair process. This aspect is particularly relevant in immunosuppressed patients or those with systemic comorbidities that compromise healing processes.

In addition to the direct benefits in postoperative healing, Vitamin C has a significant impact on the prevention and control of periodontal diseases. According to Tada and Miura (2019) individuals with a deficiency of this vitamin demonstrate a greater predisposition to gingival inflammation, advanced periodontitis and alveolar bone loss. In these cases, Vitamin C supplementation helps to modulate the inflammatory response, improves epithelial adhesion and strengthens the extracellular matrix, reducing the progression of periodontal damage.

In the context of oral rehabilitation, Vitamin C also has a positive influence on the osseointegration of dental implants. Studies show that its role in the synthesis of type I collagen and osteoblast differentiation contributes to more robust bone

formation, promoting a more stable interface between the bone and the implant, directly impacting the success of long-term prosthetic rehabilitation.

In addition, Vitamin C plays a crucial role in the oxidation and remineralization processes in the oral cavity. Its potent antioxidant action prevents the degradation of gingival and dental collagen, mitigating the harmful effects of free radicals and oxidative stress on the periodontium and mineralized tissues. In addition, its interaction with mineral homeostasis processes stimulates the deposition of calcium and phosphate ions on the dental matrix, favoring the remineralization of dental enamel and reducing susceptibility to demineralization and acid erosion.

Thus, the findings reinforce the need to consider Vitamin C as an essential element in dental practice, both in postoperative clinical management and in the prevention and control of periodontal and peri-implant diseases. The integration between dentistry and nutrition should be encouraged, promoting therapeutic approaches that combine biomedical and clinical knowledge in favor of more complete and scientifically based care. A broader understanding of the role of this micronutrient allows not only to enhance tissue regeneration and the maintenance of oral health, but also to consolidate a systemic and interdisciplinary vision of modern dental practice.

CONCLUSION

Vitamin C plays an essential role in the healing of the oral mucosa after tooth extractions, promoting collagen synthesis, angiogenesis and modulation of the inflammatory response, in addition to reducing oxidative stress and the risk of postoperative complications. Its antioxidant and remineralizing action reinforces its importance in maintaining oral health, highlighting the need for an interdisciplinary approach between dentistry and nutrition. Given its benefits, its inclusion in clinical protocols is recommended to improve tissue recovery and strengthen periodontal health.

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