




EFFECT OF OMEGA-3 FATTY ACID SUPPLEMENTATION IN THE MANAGEMENT OF CANINE ATOPIC DERMATITIS

 <https://doi.org/10.56238/isevmjv4n1-003>

Submission date: 06/12/2024

Publication date: 06/01/2025

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ABSTRACT

Objective: To evaluate the effects of omega-3 fatty acid supplementation in the management of canine atopic dermatitis (CAD), highlighting its efficacy in inflammatory modulation, skin barrier restoration, and symptom control. Atopic dermatitis in dogs is a

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persistent inflammatory condition marked by intense itching and skin barrier deficiencies, significantly impacting the quality of life of animals. Conventional treatments often fail to completely control the disease, particularly in refractory situations. Omega-3 fatty acids, especially eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) have shown anti-inflammatory and immunomodulatory properties. They act to decrease the production of pro-inflammatory mediators derived from arachidonic acid, such as prostaglandins of series 2 (PGE₂) and leukotrienes of series 4 (LTB₄). Furthermore, these fatty acids stimulate the production of ceramides, which are essential for maintaining the skin barrier, reducing transepidermal water loss (TEWL), and improving skin hydration. Studies indicate that omega-3 supplementation can reduce pruritus by up to 65% after four weeks of use, in addition to reducing the incidence of secondary complications, such as pyoderma and excoriation. These effects are more effective when associated with topical or systemic therapies, such as corticosteroids and cyclosporine. Despite advances, the ideal dose and the ratio between EPA and DHA are still not consensual, and additional studies are needed to standardize protocols. Omega-3 supplementation represents a promising approach in the management of CAD, contributing to more effective control of the disease, improving the quality of life of dogs, and reducing dependence on conventional pharmacological treatments.

Keywords: Dogs, Pruritus, Alternative therapy.



INTRODUCTION

Canine atopic dermatitis (CAD) is a chronic inflammatory skin disease characterized by intense itching, alterations in the skin barrier, and exacerbated immunological reactions. It affects genetically predisposed dogs, usually between one and three years of age, with a higher incidence in some breeds, such as Labrador Retrievers, Golden Retrievers, and German Shepherds (Scott, Miller, & Griffin, 2001; Hillier & Griffin, 2001). Canine Allergic Disease (CAD) is the second most common allergic condition in dogs, affecting approximately 10% of the canine population. Its prevalence has increased due to factors such as environmental changes and increased confinement of pets (Cosgrove et al., 2015; Santoro et al., 2019).

CAD is caused by dysfunction of the epidermal barrier and type I hypersensitivity, mediated by IgE. This combination leads to marked inflammation and increased sensitivity to allergens such as dust mites, pollen, and fungi. From a clinical point of view, the disease presents with intense or restricted pruritus, usually associated with secondary lesions such as alopecia, pyoderma, and seborrhea (Marsella, 2012; Olivry et al., 2010).

In the treatment of CAD, multimodal strategies are commonly suggested, which include topical, systemic, and dietary therapies (Marsella, 2012; Medeiros, 2017). In this scenario, the addition of polyunsaturated fatty acids, such as omega-3 and omega-6, has shown to be a promising strategy. Research indicates that these compounds control the inflammatory reaction by blocking the production of pro-inflammatory mediators, such as prostaglandins and leukotrienes derived from arachidonic acid (Cork et al., 2019; Alexandrino, 2014). In addition, they help restore the skin barrier, encouraging hydration and reducing transepidermal water loss (Scott, Miller & Griffin, 2001).

Despite the widespread acceptance of the clinical benefits of using fatty acids, doubts persist regarding the ideal quantity, the relationship between omega-3 and omega-6, as well as the period required to obtain consistent therapeutic results. This study aims to analyze the existing evidence regarding the effectiveness of omega-3 fatty acid supplementation in the treatment of CAD, to improve treatment and improve the quality of life of affected animals.



METHODOLOGY

This research was conducted as a descriptive literature review, aiming to explore the impacts of omega-3 fatty acid supplementation in the treatment of canine atopic dermatitis (CAD). Information was collected from scientific articles and reviews published between 2001 and 2021, using the PubMed, Scielo, Lilacs, and Bireme databases. "Omega-3", "canine atopic dermatitis", "fatty acids" and "pruritus" were the terms used.

The selection criteria were established based on relevance to the study objectives, giving preference to studies indexed and evaluated by other researchers. Articles that dealt with the use of omega-3 as a therapeutic adjuvant in dermatological conditions were selected, leaving out works that discussed other conditions that were not linked to CAD.

After reading, the information was analyzed and organized to highlight the clinical effects of supplementation, its mechanisms of action, and practical considerations for use in dogs. The methodological approach focused on synthesizing the most relevant and recent data available in the literature, contributing to the understanding of the topic and its applications in veterinary clinical practice.

RESULTS AND DISCUSSIONS

The addition of omega-3 fatty acids in the treatment of CAD has been extensively investigated for its ability to modulate inflammatory processes and improve the integrity of the skin barrier. Research indicates that these compounds, especially EPA and DHA, reduce the production of pro-inflammatory mediators originating from arachidonic acid, such as series 2 prostaglandins and series 4 leukotrienes. This leads to a considerable reduction in pruritus and inflammation, characteristic features of CAD (Cork et al., 2019; Alexandrino, 2014). Furthermore, the structural function of fatty acids in the creation and preservation of ceramides, fundamental elements of the skin barrier, is a fundamental aspect of treatment. Ceramides contribute to water retention in the skin, reducing TEWL loss and improving skin hydration. These impacts are especially significant in dogs with allergies, which often exhibit skin barrier problems (Scott, Miller & Griffin, 2001).



CLINICAL EFFECTS OF OMEGA-3 FATTY ACID SUPPLEMENTATION

Omega-3 fatty acids, particularly EPA and DHA, have demonstrated relevant clinical effects in the treatment of canine atopic dermatitis, bringing benefits that manifest themselves both in the reduction of symptoms and the general improvement of skin health. Clinical studies highlight that animals fed diets rich in omega-3 exhibit a significant decrease in significant effect on pruritus, one of the most uncomfortable symptoms of the disease. After four weeks of supplementation, 65% of the dogs examined showed a notable reduction in the severity of itching, which contributed to a considerable improvement in the comfort and well-being of the animals (Olivry et al., 2010).

In addition, omega-3 acts directly in restoring the skin barrier function, promoting more effective hydration of the skin. Supplementation resulted in a reduction of up to 35% in the loss of TEWL, evidencing the ability of fatty acids to strengthen the stratum corneum and protect the skin against external aggressions (Cork et al., 2019).

MECHANISMS OF ACTION OF OMEGA-3

The therapeutic action of omega-3 fatty acids in the management of CAD involves a series of interconnected mechanisms that contribute to the reduction of clinical signs of the disease and the improvement in the quality of life of affected animals. First, EPA and DHA fatty acids, essential components of omega-3, play an important role in modulating the inflammatory response. Competition with arachidonic acid for the enzymes cyclooxygenase (COX) and lipoxygenase (LOX) leads to the production of less potent inflammatory mediators, such as PGE3 and LTB5 (Cork et al., 2019; Alexandrino, 2014; Olivry et al., 2010).

These compounds have a lower inflammatory potential compared to arachidonic acid derivatives, such as PGE2 and LTB4. This anti-inflammatory effect is crucial since inflammation is a central feature of CAD, responsible for symptoms such as pruritus, erythema, and skin lesions (Cork et al., 2019; Alexandrino, 2014; Olivry et al., 2010).

In addition to modulating inflammation, omega-3s also contribute to the restoration of the skin barrier, a crucial role for skin health. Polyunsaturated fatty acids, such as EPA and DHA, act as precursors of ceramides, structural lipids essential for maintaining the skin barrier. Ceramides enhance the union between keratinocytes,



creating a lipid structure that reduces transepidermal water loss and restricts the entry of allergens, irritants, and pathogens. In dogs with CAD, the skin barrier often exhibits structural defects, which contribute to the continuation of inflammation and increase the risk of secondary infections. Supplementation with omega-3 helps to correct these deficiencies, favoring more effective regeneration of the skin barrier (Scott, Miller & Griffin, 2001; Santoro et al., 2019).

In addition, omega-3s also play a significant role in immunomodulation, controlling the allergic reactions related to CAD. Research indicates that EPA and DHA decrease the production of pro-inflammatory cytokines, such as interleukin-4 (IL-4) and interleukin-13 (IL-13), which play a crucial role in the Th2 response. These cytokines promote the creation of immunoglobulin E (IgE) and the activation of mast cells, processes that trigger the release of histamine and other inflammatory mediators during allergic reactions. By interrupting this inflammatory chain, omega-3 fatty acids contribute to the control of allergic symptoms, reducing the need for additional therapies, such as glucocorticoids (Marsella, 2012; Olivry et al., 2010).

Therefore, the use of omega-3 in the treatment of CAD provides significant advantages, acting in an integrated manner to modulate inflammation, improve skin barrier function, and regulate the immune response. Although their effectiveness may vary from person to person, taking into account aspects such as nutritional status, severity of the disease, and the composition of the supplement, omega-3s are a promising therapeutic alternative. Their use must be carried out under the supervision of a veterinarian, ensuring that the strategy is adapted to the particular demands of each patient.

Another significant clinical consequence is the reduction of secondary lesions linked to CAD. Animals that received omega-3 supplements had a reduced incidence of complications such as pyoderma, erythema, and excoriation, conditions commonly intensified by the chronic inflammatory response and pruritus. This reduction is due to the anti-inflammatory effect of omega-3s, which control the immune response and help prevent secondary infections, considerably improving the prognosis of animals affected by the disease (Santoro et al., 2019). These findings highlight the relevance of omega-3 fatty acids as an additional therapeutic strategy in the treatment of canine atopic dermatitis, providing benefits that go beyond symptom relief, favoring stronger and healthier skin.



PRACTICAL ASPECTS OF SUPPLEMENTATION

The addition of omega-3 fatty acids in the treatment of CAD has significant practical implications that need to be taken into account to ensure the effectiveness and safety of the treatment. Among these elements, are the suggested doses ideas, treatment time, sources and methods of administration, safety and possible adverse effects, as well as the possibility of interaction with other therapies (Santoro et al., 2019).

Regarding suggested doses and treatment time, there is still no total agreement on the ideal amount of omega-3 or the precise proportion between the EPA and DHA components. This lack of standardization is due to the diversity of existing studies and the complexity of the elements that affect the therapeutic response, such as the clinical condition of the animal and the quality of the source used. However, scientific evidence indicates that constant supplementation for at least two months is essential for the benefits to be perceived consistently. This interval allows the incorporation of fatty acids into cell membranes and the complete performance of their biological functions (Alexandrino, 2014; Olivry et al., 2010).

Regarding the sources and methods of administration, omega-3 fatty acids can be obtained from natural sources, such as cold-water fish oils such as salmon, mackerel, and herring, which are known for their high EPA and DHA content, respectively. Alternatively, there are commercial supplements developed specifically for dogs, providing a practical and pleasant supplementation option. In addition, several commercial diets contain omega-3, which is a practical option, especially for animals that are resistant to consuming isolated supplements. Generally, these diets are designed to provide a balanced intake of nutrients, including essential fatty acids, which promotes treatment adherence (Alexandrino, 2014).

In terms of safety and possible adverse reactions, omega-3 fatty acids are widely recognized for their remarkable safety profile when administered in appropriate doses. However, excessive consumption can result in side effects, such as gastrointestinal problems, such as diarrhea or vomiting, and changes in blood clotting, due to the impact of omega-3 on platelet function. Therefore, veterinary guidance is crucial to adapt the dose according to the weight, clinical conditions, and specific demands of each animal, reducing the risk of complications (Alexandrino, 2014).



Ultimately, omega-3 supplementation is usually more effective when combined with other therapies, in a multimodal strategy that combines several CAD management strategies. For example, mixing omega-3 with immunomodulators, corticosteroids, and therapeutic shampoos can intensify the benefits, providing a more effective reduction of symptoms and control of inflammation. This unified strategy is especially beneficial in situations of moderate to severe CAD, where the response to a single treatment may be limited (Cork et al., 2019; Santoro et al., 2019).

FINAL CONSIDERATIONS

Supplementation with omega-3 fatty acids, especially EPA and DHA, has shown to be an effective and promising strategy in the management of CAD. Its main benefits include a significant reduction in pruritus, restoration of the skin barrier, and a decrease in secondary lesions, improving the quality of life of dogs, and facilitating clinical management by owners. The inflammatory modulation and immunomodulatory effects of omega-3 highlight its relevance in the control of CAD, although its use must be adjusted to the individual needs of each patient, with veterinary supervision. Although significant advances have been made, future studies are needed to standardize doses and explore integration with other therapies. Thus, omega-3s are consolidated as a valuable resource in a multimodal approach to the control of this chronic condition.



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