

Adjunct Therapy Using Omega Fatty Acid in Canine Dermatoses

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Abstract: Dermatoses are one of the common skin disorders of canine. Omega fatty acids are having anti-inflammatory and immunomodulatory properties and used as an adjunct therapy for the treatment of canine dermatoses. Omega fatty acids particularly omega-3 and 6 can reduce pruritic, skin lesions and inflammation, helps for the improvement of skin health and coat. Omega fatty acids can enhance the immune system of dog, so that the body itself can fight off the secondary infection.

Key words: Canine, fatty acid, skin, omega 3, omega 6, adjunct therapy

Introduction

Skin and hair disorders have an important role in the small animal practice. Skin is the important organ of the body which is continuously exposed to a variety of irritants. Skin is the most important immunological structure and needs high amounts of nutritional requirements. Canine dermatoses refer to the skin abnormalities caused

by different reasons including physical or chemical agents, immune factors, microorganisms, hormonal imbalance and nutritional deficiencies. Several nutritional elements have an impact on the skin and coat. Nutritional disorders can lead to dull coat with brittle hairs, crusts, scale, erythema formation and delayed hair growth. These consist of bacterial infection, parasitic infestation, food allergies and adverse food effects. Dogs are suffering from a wide variety of inflammatory skin diseases. The cause of this inflammation is the type 1 hypersensitivity reactions mediated by IgE (Immunoglobulin E). Variations in the amount of dietary fatty acids can leads to these reactions. Inflammatory skin diseases in dogs can be treated by fatty acids supplementation.

The mechanism of essential fatty acid (EF A) supplementation in atopic patients is to modify the metabolism of fatty acids to produce less inflammatory mediators. Pruritus, self-trauma, yeast infection, or secondary bacterial infection is the outcomes of atopic dermatosis. In addition, persistent otitis externa may be noted; nevertheless,

the history and clinical manifestations must be closely examined in order to make this diagnosis. Certain breeds, like Chinese Shar Peis, Irish setters, Dalmatians, Labrador Retrievers, various terrier varieties, and toy breeds, are more prone than others. When the dog is exposed to IgE-sensitive mast cells, which degranulate and produce a host inflammatory response, clinical symptoms start to appear. After being exposed to the antigen, this happens. Histamine, heparin, proteolytic enzymes, chemotactic factors, and different forms of eicosanoids are examples of the inflammatory mediators

The main reason a fatty acid is considered as essential is because animals cannot synthesis it in large enough amounts to meet their metabolic requirements. Functionally, the fatty acid must make a substantial contribution to wellbeing and health. Structurally, they contain at least two double bonds. This precise molecular structure of fatty acids allows it to fold over itself in three dimensions, allowing it to take part in physiologic processes and cell membrane functions crucial to good health. These fatty acids have a major impact on numerous membrane properties, including fluidity, compressibility, permeability, and fusion. Several clinical trials have reported the efficacy of supplementation of fatty acids as an adjunct therapy for canine dermatoses.

Omega fatty acids

Fats and oils are an important component of a canine's balanced diet. Fatty acids are the building blocks for the formation of fat. Dogs need specific fatty acids in their diet because their bodies are unable to produce them and referred as essential fatty acids. Omega-3 (n-3) and omega-6 (n-6) fatty acids are the two groups into which these EFAs are divided. Polyunsaturated fatty acids (PUFAs), *viz.* omega-3 and omega-6 FAs, are involved in many cellular processes, including as signalling, cell-to-cell communication, fluidity, and the preservation of the cell membrane's structure. Omega-3 FAs are mostly consisting of ALA (Alpha-linolenic acid), DHA (Docosahexaenoic acid), and EPA (Eicosapentaenoic acid). Fats are thought to be an essential part in keeping a healthy skin coat. Fish oils include high levels of both EPA and DHA, while canola (rapeseed) oil, pumpkin seeds, walnuts flaxseeds, soybeans, perilla seed oil and their derivative oils are the main sources of ALA. Omega-6 fatty acids primarily consist of Arachidonic acid (AA), Linoleic acid (LA) and Gamma linolenic acid (GLA). Among all n-6 fatty

acids, LA is the most significant one. Corn, canola, safflower, sunflower, and whole grain oils are the main sources of LA. EFAs deficiency in the body affects in the important body functions leads to Chronic coat and skin disorders.

Effects of omega fatty acids in canine skin health

Fatty acids supplementation in canines is mostly recommended for the pruritic skin disorders like atopic dermatitis, flea bite dermatitis, adverse food reaction and idiopathic pruritic. EFAs play a crucial role for maintenance of water permeability barrier of the skin. LA is the precursor of prostaglandins in canines and helps in maintaining the epidermal permeability barrier. Ceramide, which is generated from omega-6 fatty acids (LA), makes up the cell membrane of the skin's epidermal water barrier. These lipid components give the epidermis an effective water barrier while also increasing skin cell cohesiveness. This is the reason that supplementing with dietary vegetable oil high in this fatty acid helps many dogs with dry, dull hair coats and scaling, non-prickly skin conditions. This explains why certain dog cases of scaling, non-prickly skin conditions and dry, dull hair coats improve when dietary vegetable oil containing this fatty acid is supplemented.

Since these two fatty acid types are known to compete metabolically, omega-3 fatty acids (ALA) may also function similarly to LA. Consequently, due to its ability to preserve LA in skin ceramide lipid fractions with reduced water loss, α -linolenic acid may be beneficial for the health of dog skin. Omega 3 and 6 FAs can also regulate the inflammatory response by generating fewer pro-inflammatory mediators from precursors. These are EFAs and very much necessary for maintaining the structural integrity of membranes, for transport of cholesterol, for the maintenance of the function of epidermal barrier and for formation of eicosanoids especially the prostaglandins and leukotrienes. The regulation of cutaneous inflammation, immune system modulation, and epidermal proliferation are all influenced by eicosanoids. Thus, when alopecia is likely to occur, supplementation with these fatty acids should be considered.

Dosages

Dose rate of ALA was 300 mg/Kg/day and the dose rates were calculated as per the recommendations of Association of American Feed Control Officials (AAFCO) (2023). Dogs on 66 mg/Kg body weight of LA daily for 6 weeks may be helpful for skin conditions. Supplementing dogs

with atopic dermatitis with one teaspoon (5 mL) of vegetable oil and animal fat or fish oil per cup (225 g) of diet may help them.

Conclusion

Deficiency in EFA has been identified as a significant factor in skin diseases. LA and ALA are important in this regard. By using omega 6 and omega 3 FAs supplementation for the management of skin disorders are the most exciting methods. Conventional therapies can have drawbacks and adverse effects, but they often provided relief. For dogs with dermatoses, the adjunct use of omega fatty acids to conventional therapy may improve therapeutic results, lower the need for steroids and antibiotics, and enhance overall health.

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