

Efficacy of Tyndallized *Lactobacillus reuteri*, Blackcurrant Seed Oil, Zinc Oxide and Nucleotides on Skin and Gut Microbiota of Atopic Dogs

Canine atopic dermatitis (AD) characterized by chronic skin inflammation, itching and recurrent skin infections. Both genetic and environmental factors are involved in the pathogenesis. It is likely that a defective skin barrier allows microbial adherence, penetration of allergenic proteins, and initiation of abnormal inflammatory response. Treatment guidelines have emphasized the need for a multimodal approach with topical and systemic products [2]. Despite the encouraging results obtained using novel therapies, researchers have invested in searching for natural compounds able to reduce the needs of medications. Considering dysbiosis of skin microbiota as hallmark of AD [3] and the connection between the intestine-skin axis, the most repeated attempt was done looking into probiotics as a potential tool to reduce clinical signs [4–8]. This study was conducted as a pilot study (open and uncontrolled), in which the efficacy of a nutraceutical composed of blackcurrant seed oil, tyndallized *Lactobacillus reuteri*, zinc oxide and nucleotides was tested in atopic dogs.

Were recruited 45 dogs with atopic dermatitis. All dogs received a capsule containing *Lactobacillus reuteri* NBF-1 at dose of 6×10^9 colony forming units (CFU) per day, in association with pre-existing maintenance therapy. Group 1 (n=32) took the probiotic for 60 days, Group 2 (n=13) took the probiotic for 120 days. On D₀ a stool sample was collected and was completed a clinical form comprising Canine Atopic Dermatitis Lesion index (CADLI), Visual Analogic Scale (VAS) and faecal score (FeSc). The same procedure was repeated every 30 days for 120 days in all dogs. Was performed 16S rRNA gene sequencing of microbiota DNA in order to calculate the dysbiosis index (DI) [9].

There were no significant difference in the value of VAS and DI between the 2 groups at D₀, instead the means of CADLI and FeSc were different. Analyzing the data of Group 1, taking D₀ as a reference, on D₆₀ the mean VAS was lower by 1.20 points; CADLI was reduced by 3.66 points; FeSc was reduced by 0.53 points and DI was also reduced: -3.90. After the suspension of the probiotic, the scores of clinical parameters and DI tend to increase towards the initial values, but these results are not statistically significant.

In Group 2, each additional day of treatment a is associated with an extremely significant decrease of 0.01 points in VAS mean value; -0.023 in CADLI; -0.004 in FeSc, -0.041 in DI. Comparing the data at D₆₀ of Group 1 with D₁₂₀ of Group 2, VAS and CADLI are the parameters that show a significantly lower score (-0.91, -5.09 respectively).

The use of tyndallized *Lactobacillus reuteri* orally has led to an improvement in clinical symptoms; furthermore, the product alters the gut microflora composition and convert dysbiosis to eubiosis state. The existence of a gut-skin axis is supported by increasing evidence, and the positive correlation between quality-quantity improvement in intestinal microbiota and in clinical conditions highlights its translational potential. Probiotics that act directly at the intestinal level could be valid allies to be associated with the CAD long-term drug therapy.

Keywords: Atopic Dermatitis; Dog; Itching; Gut Microbiota; Gut-Skin Axis; Probiotic; Tyndallized *Lactobacillus reuteri*

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