Hair Mineral Levels in Dogs with Atopic Dermatitis

Emanuela BADEA^{1*}, Gheorghe Valentin GORAN¹, Victor CRIVINEANU¹

¹ UASVM of Bucharest, Faculty of Veterinary Medicine, 050097, 105 Splaiul Independentei, 5th district, Bucharest, Romania, EU

*corresponding author: emanuela.badea@gmail.com

Bulletin UASVM Veterinary Medicine 73(2) / 2016,

Print ISSN 1843-5270; Electronic ISSN 1843-5378

DOI:10.15835/buasvmcn-vm: 12217

Abstract

Atopic dermatitis is a genetic allergic skin disease that can be triggered by various environmental factors. This research aimed to study the possible correlation between heavy metal and mineral concentration and presence of atopic dermatitis. Hair samples from dogs suffering from atopic dermatitis were analyzed and compared to samples from the control group via ICP-OES method. Cu was the only element significantly decreased ($p = 0.01$) in the study group. No statistical significance was found for heavy metals.

Keywords: *atopic dermatitis, dogs, hair, heavy metals, minerals*

INTRODUCTION

Atopic dermatitis is a genetically predisposed allergic disease, characterized by skin inflammation and pruritus. (Halliwell, 2006) Along with genetics, other factors can trigger the appearance of atopic dermatitis, such as dietary hypersensitivity (Saridomichelakis and Olivry, 2016), bacterial infections, excessive heat, and exposure to skin irritants. (Williams, 2005) Various studies have taken into consideration the influence of heavy metal contamination on atopic dermatitis. (Kim, 2015) Chronical internal exposure to Ni, Co, and Cr can determine allergic cutaneous reactions (Basko-Plluska *et al.*, 2011), as does exposure to other metals, like Cd, Pb, Cu (Koller, 1980), and Hg. (Park and Kim, 2011)

AIMS AND OBJECTIVES

The study aimed to determine the possible correlation between heavy metal and mineral concentration and presence of atopic dermatitis.

MATERIALS AND METHODS

Research was conducted on a study group (SG), consisting of six common breed dogs with atopic

dermatitis (three males and three females, three above three years of age and three below three years of age), and a control group (CG), consisting of six clinically healthy common breed dogs (two males and four females, three above three years of age and three below three years of age).

Heavy metal and mineral concentration was determined using the ICP-OES method.

RESULTS AND DISCUSSION

Heavy metal and mineral mean concentration, standard deviation, standard error, and p -value are shown in Tab.1. Fig. 1 shows the mean heavy metal and mineral levels in the study group and control group with standard deviation error bars. As, Cd, and Hg mean levels were higher in the study group, and Ni and Pb mean levels were higher in the control group, but with no statistical significance. K, Mg, Mo, Na, and Zn mean levels were increased in the study groups, and Al, Ca, Co, and Fe mean level was higher in the control group, but with no statistical significance. However, Cu was significantly decreased ($p = 0.01$) in the study group.

Tab. 1. Heavy metal and mineral mean concentration, standard deviation, standard error, and *p*-value

Element	Mean (ppm)		Standard deviation		Standard error		<i>p</i> -value
	Study group	Control group	Study group	Control group	Study group	Control group	
Al	129.24	138.85	52.88	65.72	26.44	13.22	0.9886
As	1.08	1.04	0.23	0.23	0.10	0.05	0.3546
Ca	2059.52	2705.74	1612.97	999.59	806.49	403.24	0.8319
Cd	0.60	0.47	0.13	0.17	0.05	0.03	0.4764
Co*	5.93	7.30	2.50	3.44	1.02	0.51	0.5436
Cu	6.18	18.83	3.56	1.23	1.78	0.89	0.0106
Fe	129.70	179.76	69.49	86.31	34.74	17.37	0.6975
Hg	0.48	0.39	0.15	0.14	0.06	0.03	0.4590
K	1169.09	865.77	959.36	336.58	479.68	239.84	0.4050
Mg	168.34	167.46	140.26	35.30	70.13	35.07	0.7016
Mo*	11.58	10.08	3.91	1.72	1.60	0.80	0.1808
Na	1969.20	1379.62	933.27	667.53	466.63	329.96	0.4447
Ni	1.24	1.98	0.78	0.12	0.35	0.17	0.1825
Pb	1.32	1.81	0.83	0.93	0.34	0.17	0.5808
Zn	148.50	138.24	10.45	24.30	5.22	2.61	0.3173

* mean concentration measured in ppb

Fig.1. Mean heavy metal and mineral levels in the SG and CG**CONCLUSION**

No statistical significance has been registered for heavy metals and minerals present in hair samples from dogs with atopic dermatitis,

excepting Cu, which was significantly decreased ($p = 0.01$) in the study group, implying a Cu deficiency in atopic dermatitis. In samples from the study group, As, Cd, and Hg registered higher levels.

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