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The Role of Diet on Diabetes Mellitus

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Abstract- In this study we took 2921 dogs, 34% were adults and 66% of them were young. These dogs were subjected to tests for the diagnosis of diabetes mellitus, and 10 of them were positive. 34% of adult dogs were overweight and obese. All dogs were grouped according to the type of food they consumed. The percentage of obesity based on the type of food they consumed was: dry food 35%, home food 30%, mix food 25%, cans 10%. The study showed that 6 dogs were obese and diabetic, 4 dogs were diabetic but not obese.

Keywords: *obese, overweight, cans, dry food, mix food, home food, diet.*

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The Role of Diet on Diabetes Mellitus

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I. INTRODUCTION

The prevalence of combined overweight and obesity in domestic canine populations has been reported to range from 23%[1] to 41%[2]. Other studies in canine pet populations have found relationships between canine obesity and musculoskeletal disorders[3,5], cardiovascular problems[5], glucose intolerance and diabetes mellitus [6,7] and bladder [8] and mammarycancer[9].The main objectives of this study were to recognize obesity in dogs and its impact on Diabetes Mellitus.

II. MATERIALS AND METHODS

The study was focused at 5 clinics in the city of Tirana. The dogs presented to the clinics for various purposes, such as vaccination or other routine checks, went through a rapid blood test. During the period 2013 - 2015 as many as 2921 dogs of different breeds were an integral part of the study. All of them were subjected to a rapid test of blood glucose. Those dogs with indicators standing at levels above 120 mg / dl underwent further comprehensive blood tests to determine their case better. The animals with pregnancy problems were excluded from the study because their glucose indicators might be compromised. Those animals with levels at above 120 mg / dl were considered to be positive. Results for each animal testing positive were recorded and questionnaires were completed accordingly with information about the animal and also about the living conditions and their food. All these data are entered into a database. Breeds of dogs are classified on the basis of breed manuals with cross breeds being considered as mixed ones. Also, positive animals were grouped according to their age, gender, and breed.

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III. RESULTS AND DISCUSSION

A total number of 2921 dogs of different breeds were examined in this study, including Labradors retrievers, mixed, coli, Yorkshire terriers and others. These dogs underwent rapid tests and the following results were obtained. Blood glucose analysis showed that 10 individuals or 0.34% of dogs examined in clinics across Tirana district tested positive with diabetes. Those 10 dogs that were positive for diabetes tests, 6 of them were with diabetes and obese, 4 of them were diabetic but not obese. This figure points to a low frequency of diabetes as well as to the fact that the pathology shows no upward tendency.

Total	2921	100%
Not diabetic	2911	99.66%
Obese diabetic	6	0.20%
Not obese diabetic	4	0.14%

Figure 1: Diabetic dogs

Blood glucose analysis showed that 10 individuals or 0.33% of dogs examined in clinics across Tirana district tested positive with diabetes. This figure points to a low frequency of diabetes as well as to the fact that the pathology shows no upward tendency. Adult dogs over 34% (338 dogs) of them were overweight and obese. The prevalence of obesity in adult dogs was 6.5%. (65 dogs).

Total	993	100%
Normal dogs	655	66%
Obese	65	6.5%
Overweight	273	27.5%

Figure 2: obese and overweight dogs

In this study, we analyzed the type of food they consumed to see its impact on obesity. Dogs that consume liquid foods or canned (10%), consume dry food (35%), indoor food as their main source of diet (30%) mixed food (25%).

Types of food	2921	100%
Cans	292	10%
Dry food	1022	35%
Home food	876	30%
Mix food	731	25%

Figure 3: Types of food

The study showed that some dogs who consumed processed foods, were more likely to be obese. 1.5% of dogs who consumed the cans were obese, 2% of dogs who consumed dry food were obese, 1% of dogs who consumed the food home were obese, 2.3% of dogs who consumed mix of food were obese.

Obesity	65	6.5%
Cans	7	0.7%
Dry food	29	2.9%
Home food	11	1.1%
Mix food	18	1.8%

Figure 4: Obesity by food type

The food to diabetic dogs should provide adequate calories to achieve and maintain optimal body condition. Dogs with poorly controlled diabetes have a decreased ability to metabolize the nutrients absorbed from their gastrointestinal tract and lose glucose in their urine, so require more calories for maintenance than healthy dogs. The diet should be nutritionally balanced and needs to be palatable so that food intake is predictable. Meals should ideally be time so that maximal exogenous daily insulin-dosing regimen tends to be fixed for diabetic dogs [10]. It is also important that a predictable glycogenic response is achieved following each meal. Consequently, every meal should contain roughly the same ingredients and calorie content, and should be fed at the same times each day. The owners of diabetic dogs should be aware that a consistent insulin dosing and feeding routine is optimal although, for practical reasons, a certain amount of compromise may be necessary in individual cases. For several decades, there has been a great deal of interest in research into the composition of an optimal diet for people diagnosed with the various forms of diabetes mellitus. As a result, it is now recognized that dietary management plays a central role in the treatment of diabetic people. More recently, veterinary researchers have started to follow this and comparison can now be made between the dietary recommendations for diabetic people and those for dogs. Before the advent of insulin therapy, fat and protein were the main sources of energy in the diets prescribed for people with diabetes. Dietary carbohydrate was avoided in an effort to reduce hyperglycemia. Diets currently recommended for diabetics are the result of substitution of the saturated fat content with complex carbohydrates. The primary reason for this change was the realization that the risk of death due to cardiovascular disease could be greatly reduced by lowering plasma cholesterol [11]. It is now highly recommended that 55 to 60% of a diabetic dogs total energy should be provided from carbohydrate and the majority of the carbohydrates should be complex, containing high amounts of resistant starch and fiber [12]. There is no clear

evidence of clinical benefit in diabetic dogs of diets formulated with higher amounts of fiber than normal diets formulated. Alterations in lipid metabolism are common in men and dogs with insulin deficiency. In dogs, unlike what happens in humans, there are no meaningful relationships between diabetes, arteriosclerosis and coronary heart disease. In many diabetic dogs, however, are present exocrine pancreatic diseases [13]; diabetes can also be a risk factor for pancreatitis. A diet high in fat and hypertriglyceridemia are possible causes of canine pancreatitis [14]; for dogs with chronic pancreatitis are recommended diets with a low-fat content (<20%), and since it can be difficult to identify dogs with pancreatic subclinical, it would be prudent to feed all the dogs with diabetic diets with a share of restricted fat (<30%). There is an inverse relationship between the dietary fat, postprandial blood glucose and insulin response. Random clinical checks have shown that low-fat diets can lead to an improvement of the lipid profile, but they can contribute to undesirable weight loss. Although, therefore, there are no obvious clinical benefits in feeding diabetic dogs with restricted fat diets, this option can be recommended for dogs that have both conditions (diabetes and pancreatitis). By contrast, in already meager dogs it is not advisable to give the same diet to prevent further weight loss that would aggravate the condition of the animal. A diabetic dog diet has been formulated which sets an ideal protein; so that in this way there are no differences between healthy and diabetic dogs. With the reduction of carbohydrates and fats, proteins tend to represent the main source of energy; however, even if they are not reported adverse effects, if the necessary calories come from protein, for a share of 30- 45%, adequate attention should be given to subjects with microalbuminuria and proteinuria [16]. L-carnitine exerts an important role in the metabolism of fatty acids. An addition of 50 ppm in the diet, in dogs, the increases fatty acid oxidation and protects muscles from catabolic processes when there is a large weight loss [14]. The dogs where there is the monitoring of diabetes, lose weight, have alterations in lipid metabolism and undergo cytochrome, are, therefore, benefit from carnitine supplementation to the diet. Since for most older dogs and middle-aged, the reduction of body mass is already present before the start of the weight loss associated with diabetes; consequently carnitine is a valuable aid for these animals [16].

IV. CONCLUSION

Successful long-term management of a diabetic dog sometimes requires permanent changes to the lifestyles of both owner and dog and so individualization of the advice given is imperative. A relationship based on trust and co-operation between veterinarian and client invariably leads to the most satisfactory outcome.

The ongoing treatment of a diabetic dog can be one of the more rewarding experiences of small animal practice and many diabetic dogs and their owners come to occupy a special place within the clinic environment.

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