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PREVALENCE OF DIABETES MELLITUS IN DOGS IN ANIMAL CARE CENTERS IN ANTALYA

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ABSTRACT

Diabetes mellitus is an endocrine disorder that often seen in dogs. Depending on the severity of the metabolic disorder, the disease can be asymptomatic or can be characterized by clinical symptoms such as polydipsia, polyuria, polyphagia, weight loss and weakness that affects many organs and systems. The influence of genetic and environmental factors on the formation of the disease is great. Diabetes mellitus is mostly seen in dogs over four years of age, but rarely in puppies. The incidence of the disease is known to be higher in female dogs than in males. Along with genetic factors, diet, physical inactivity, drugs and obesity are influential in the formation of the disease. In this study, diabetes mellitus scan was performed on 150 dogs brought to animal care centers in Antalya province, but no diabetic dog was found. Dental examinations made on dogs were found to be the largest dog is 3.5 years old. According to this result, it was observed that the dogs living in the streets could not live more with the effects of poor care, nutrition and hunger. It was thought that the survival of the dogs in the nursing homes and the younger average age, and not the races predisposed to this disease, were effective in the absence of diabetes mellitus.

1. INTRODUCTION

In 1889, Joseph von Mering and Oskar Minkowski discovered that the removal of pancreas from healthy dogs prepared the ground for polyuria, polydipsia and diabetes. They have noticed that the pancreas should secrete an anti-diabetogenic factor that allows the body to use its glucose (1). A diabetic dog treated with insulin in 1921 was a guide in the treatment of diabetic people (2).

The effect of genetic and environmental factors on the formation of diabetes mellitus is great (3,4). Diabetes mellitus is seen more often in dogs aged four years and older, but it can rarely develop in puppies. The incidence of the disease is approximately 0.2% in dogs and there are more diseases in females than in males (5,6). Along with genetic factors, diet, physical inactivity, drugs and obesity are effective in the development of the disease (7). Pancreatitis is responsible for this disease as well as etiology in trauma, inflammation, infection, neoplasia and autoimmune diseases (8).

Dogs in the early stages of diabetes mellitus are classified as subclinical diabetic. Subclinical diabetic patients often appear to be healthy, have a constant weight, and are usually diagnosed when performing routine laboratory studies for other reasons. Animals with clinical diabetes show findings such as polyuria, polydipsia, polyphagia, and weight loss. Some animals may show signs of systemic disease due to diabetic ketoacidosis such as anorexia, dehydration and vomiting. Additional problems may be lethargy, malaise, cataract (in

dogs), jumping movements and abnormal gait (9).

The most common laboratory abnormalities in diabetes mellitus are hyperglycemia, glycosuria, increased hepatic enzyme activities, hypercholesterolemia and hyperproteinemia (3).

The blood glucose level is above 200 mg / dl in most patients, whereas the blood glucose level in asymptomatic diabetes is usually 125-180 mg / dl (10).

The mainstay of treatment for Diabetes Mellitus is insulin, along with diet modification. However, insulin therapy is not indicated for subclinical disease in dogs and cats, unless hyperglycemia has worsened and glycosuria is not indicated (2).

Today, a veterinary clinic working in close cooperation with dog owners will improve the diabetes team and ensure the individualization of diabetic pet care. Clinical diabetes protocols should be adapted and flexed, taking into account the effects on concomitant diseases and glycemic as well as the quality of life of the diabetic dog and the owner (1).

2. MATERIALS AND METHODS

Animal Material and Properties

In this study, 150 animals in the Animal Care Centre of both sexes (110 females, 40 males), in different age groups, castrated and not castrated dogs formed the study material. Anamnesis information, weight, gender, age, biochemistry glucose results, rapid test kit glucose results, urine strip glucose results and photographs of all dogs were recorded. Blood samples were collected from all dogs before feeding.

Urine samples from dogs were checked with urine strips (Aution Sticks 11A Chemical Urinlaysis Strips, Shandong Yaohua Medical Instrument Corporation, China).

Blood glucose samples were taken from the vena cephalica and blood glucose test kits (with a glucometer) were used to measure the initial blood glucose value. The blood was then centrifuged at 3000 rpm for 10 minutes to remove the serum.

Glucose measurement was performed from all serum samples in Fujifilm DRI-CHEM NX500i biochemistry instrument.

Preparation of Tests

Urine samples from dogs were compared with color immersion by strip immersion (Figure 1-2).

Figure1. Glucose measurement with urine strips in urine samples.

Figure 2. AUTION Sticks and result.

In the blood samples taken from dogs, glucose levels were measured with a fast glucose meter (Diavue Prudential Blood Glucose Monitoring System, BioCare Corporation, Taiwan) (Figure 3). Blood drawn directly from each dog was touched into the strip's absorbent chamber until the approval windows in the test strips attached to the glucometer were filled completely with blood (Figure 3).

Figure 3. Diameter Prudential Glucometer, measurement and device

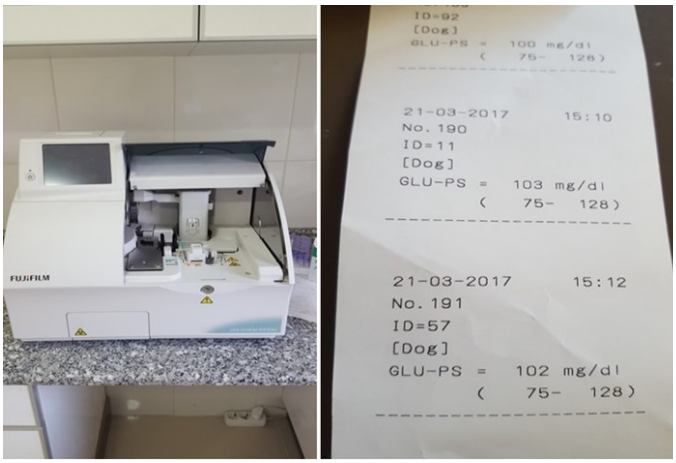

Figure 4. Fujifilm DRI-CHEM NX500i biochemistry device and biochemical results.

Blood was drawn from the vena cephalica to the serum tubes with intravenous injection port radiopaque catheter cannulas and centrifuged at 3000 rpm for 10 minutes. Serums were placed in tubes and placed in biochemistry apparatus (Fujifilm DRI-CHEM NX500i). QC cards for glucose measurement were defined on the device. Patient information was entered on the touch screen. The instrument was inserted into the pipette tip, Type A (the section where the glucose was evaluated) and the measurement was started by pressing the confirmation button. (Figure 4).

3. RESULTS

Blood samples were collected from 150 dogs from different age groups and from dogs of both sexes who were neutered and not sterilized from the Animal Care Center in Antalya. 110 of the samples taken from female dogs, 40 of them were taken from male dogs. 84 of them were not castrated (61 female, 23 male), 66 were castrated (49 female, 17 male) dogs.

No significant difference was observed when the mean age and sex of female and male dogs were compared. Distribution of animals by breed is shown in Table 1.

The percentages of castrating of both sex dogs are shown in Table 2.

The mean age of both sex dogs is shown in Table 3.

There was no statistically significant difference between the mean age of male and female dogs ($p = 0.245$).

Table1. Dog breeds collecting blood samples.

	n	%
Mix Hunting	1	0.7
Mix Collie	1	0.7
Shepherd Dog	1	0.7
Mix Shepherd	1	0.7
Collie	2	1.3
Doque Allemond	1	0.7
Drahta	1	0.7
Fino	4	2.7
Fino Hybrid	1	0.7
Fino Crushing	1	0.7
Golden	8	5.3
Mix Golden	1	0.7
Kangal	2	1.3
Mix Kangal	3	2.0
German shepherd	2	1.3
Mix German shepherd	1	0.7
Labrador	1	0.7
Unknown mix	106	70.7
Mix Pitt	1	0.7
Pointer	1	0.7
Mix Pointer	3	2.0
Mix Rot	3	2.0
Saint Bernard	1	0.7
Siberian	1	0.7
Mix Siberian	1	0.7
Mix Terrier	1	0.7
Total	150	100.0

A comparison of the glucometer and biochemistry results of the dogs of both sexes is shown in Table 4.

There was no statistically significant difference between the two results averages of female and

Table 2. Percentage of sex and casterization.

		n	%
Gender	Female	110	73.3
	Male	40	26.7
Sterilization state	Not castrated	84	56.0
	Castrated	66	44.0

Table 3. Age average comparison of female and male dogs.

		Age (months)		p
		Mean	Standard Deviation	
Gender	**Female**	18	12	0.245
	Male	21	18	

Table 4. Glucometer and biochemistry result according to gender (mg / dl).

	Gender				p
	Female		Male		
	Mean	Standart Deviation	Mean	Standart Deviation	
Glukometer	92.75	25.28	94.78	22.26	0.655
Biochemistry Device	86.64	23.57	92.00	22.16	0.213

Table 5. Glucometer and biochemistry results in relation to weight (rs = correlation number).

	Weight	
	r_s	P
Glukometer	-0.359	<0.001
Biochemistry Device	-0.186	0.022

male dogs when compared to gender by the glucometer and biochemistry results (p = 0.655; p = 0.213).

Glucometer result was statistically significant, negative and weak relationship was found between weight. Similarly, a statistically significant and negative correlation was found between the results of biochemistry device and weight. But this relationship seems to be very low (Table 5).

There was no statistically significant difference between the results of glucometer results of castrated and not castrated dogs (p = 0.579). The mean biochemistry of not castrated dogs was statistically higher than that of castrated (p = 0.014) (Table 6).

When the mean values of glucose, glucometer and biochemistry devices of all blood samples were compared, it was found that glucometer mean was higher than biochemistry (p <0.001) (Table 7).

DISCUSSION

Diabetes mellitus is a common endocrine disorder in dogs. Clinical manifestations include polydipsia, polyuria, weight loss, hyperglycemia and glucosuria. Samoyed, Tibetan Terrier and Cairn Terrier are among the predisposed races of Diabetes mellitus, while others such as Boxer and German Shepherd Dog seem less prone to it. It is reported that this breed is a genetic component and at least one dog leukocyte antigen haplotype is associated with a predisposition to diabetes (5).

In this study, 150 dogs were randomly selected from male and female, neutered and uncensored men from animal shelter and nursing homes in Antalya. 70.7% of them consisted of mix breed and 29.3% of them were pure breeds. Since the dogs in the study were populations from the street, it was observed that the dogs were not among all races susceptible to diabetes and were among the most crossbred races. Diabetes is usually seen in dogs aged 4-14, but the highest incidence is between 7-9 years of age (11). In our study the mean age of the dogs was 18 months in females and 21 months in males. The dog population from the street was determined to be very young. In this study, it was observed that dogs living in the streets were unable to survive on the streets due to environmental conditions, inability to develop resistance to diseases, and inability to develop resistance to diseases.

In the analysis of Guptill et al. (12), between 1970-1999, 19 cases from 10000 dogs in 1970 and 64 cases in 1999 were identified. In our study, 150 dogs were screened and no cases of diabetes

Table 6. Results of glucose values measured by glucometer in dogs sterilized and not sterilized (mg / dl).

	Castration State				p
	Not Castrated		Castrated		
	Mean	Standart Deviation	Mean	Standart Deviation	
Glukometer	94.27	23.76	92.03	25.44	0.579
Biochemistry Device	92.17	22.56	82.85	23.24	0.014

Table 7. Glucometer and biochemistry device result comparison for glucose in all blood samples (mg/dl).

Glucose Values With	Mean	Standart Deviation	p
Glukometer	93.29	24.46	<0.001
Biochemistry Device	88.07	23.25	

mellitus were encountered. In a study conducted by Ekiz et al. (13), 44 patients investigated whether glucometer and biochemistry devices were more accurate in glucose monitoring. A comparison of the patient's glucometer used in diabetes management and the autoanalyzer device using the reference method was performed. 2 cc venous blood samples were taken from antecubital vein and transferred to EDTA tubes. All portable glucometers were found to measure higher values than the reference method. Similarly, in our study, the glucometer mean was higher than the biochemistry when the glucometer and biochemistry results were compared in all blood samples. The result is statistically significant. In a study conducted in our country (14), the effect of ovariohysterectomy on metabolism activities was investigated. In this study, the effect of ovariohysterectomy on the body weight and serum total cholesterol, triglycerides, some liver enzymes and glucose levels in the female dogs with different race, age and maintenance conditions were investigated. For this purpose, the body weights and biochemical values were determined in 15 females, before the ovariohysterectomy operation and at 3, 6 and 12 months after the operation. When the body weights of the periods mentioned were evaluated statistically, the difference between before operation and 6 months after the operation and before operation and 12 months after the operation was statistically significant (P <0.05). No statistically significant difference was found between the parameters of serum before and after ovariohysterectomy. In this study, a statistically significant, negative and weak relationship was found between the glucometer result and weight. Similarly, a statistically significant and negative correlation was found between the results of biochemistry device and weight. But this relationship seems to be very weak. There was no statistically significant difference between the averages of the two groups (p = 0.579), and the mean values of the biochemistry device were not statistically significant (p = 0.014).

CONCLUSION

As a result, Diabetes mellitus screening was not observed in 150 dogs in animal shelter and nursing homes in Antalya. The urine samples from dogs were compared with those of the color scale, and the results in all dogs were observed in normal reference ranges for glucose.

In the study, it was estimated that the largest dog was 3.5 years old with a dental examination. Accordingly, the effect of poor care, nutrition and hunger on the street dogs was thought to have a

large role in the emergence of this result.

In our study, the glucose level of 5 dogs was over 120 mg / dl. In re-measurements, it was determined that feeding time and stress were eliminated when normal reference values were regressed and diabetes mellitus was not present. Repeat measurements were repeated on an empty stomach for 3 days.

It is thought that the life expectancy and age of the dogs in the nursing homes is also younger than the races that are predisposed to the disease and it is thought to be effective in the absence of diabetes mellitus. With this study, the first screening of diabetes was performed in dogs in the shelter and nursing homes in Antalya and no diabetic dog was detected.

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