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STUDY ON CLINICAL AND THERAPEUTICAL APPROACHING PETS WITH DIABETES AND OBESITY

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As in human medicine, in veterinary medicine I have noticed that obesity in pets favor the appearance of diabetes through an event called "insulin resistance". Patients taken in study (both dogs and cats, females and males, neutered or not) have shown risen blood sugar levels while fasting and were overweight or obese. These animals were investigated following a schedule: anamnesis, clinical examination, blood tests, urine tests, ultrasounds, cardiology examination, eye examination and neurological examination. Some animals showed insulinemia and fructosamine. They were weighed and those weighing more than 8% were considered overweight, while those exceeding 20% were classiefied as obese. Depending on the glucose outcome, animals in the study were classified into 3 categories: (1) hyperglycemia, (2) Type II diabetes, (3) Type I diabetes. For every re-control, the patients were weighed and had their abdominal and chest diameter measured. The diet involved the food for diabetes, and for those who were obese, almost 30% of their diet consisted in weigh tloss food. Animals treated accordingly and in time showed great results in both glycemia determination and losing weight. Some cats were resolved, the blood sugars being normal when they reached normal weight, but remained potentially diabetic.

Key words: Diabetes mellitus, fructosamine, glycaemia, obesity.

INTRODUCTION

Present nutritional-metabolic pathology in both, humans and pets, is especially represented by diabetes, obesity and dyslipidemias.

These diseases are chronic and evolve asymptomatic a long time.

Clinical evolutionary developments require a correct and timely diagnostic, to avoid complications from nutritional-metabolic diseases (cardiovascular diseases, neurological changes, ophthalmological modifications, and diabetic glomerulonephritis)[4].

Professor Day and collaborators, in 2010, stated: "We cannot understand obesity in dogs and cats without knowing certain aspects about obesity in humans, the social status of the owner and the human-dog/cat relationship. If the human is overweight, then his dog will also be overweight"[9].

Obesity is defined as an excess accumulation of fat in the body and is the most common nutritional disease occurred in pets.

Obesity is the result of inappropriate food administration (quantity and quality wise) and/or inadequate energy usage[10].

This disease makes animals sensitive to orthopedical issues, diabetes, lipid abnormalities in blood circulation, cardiorespiratory disorders, urinary disorders, reproductive disorders, neoplastic disorders (breast tumors), dermatological diseases, and complications in anesthesia. Numerous studies have shown that obesity influences the quality and duration of life in dogs and cats[11].

The adipose tissue is the most common tissue in the body. It is very well vascularized and innervated. It is sensitive to the action of certain hormones such as: ACTH, cortisol, insulin. It is well represented in hypoderm where it forms an insulating layer by reducing heat loss from the skin. It is well represented around some main organs, such as: adrenals, the eye etc.[8]

Regulating lipid metabolism occurs by two mechanisms: lipogenesis and lipolysis.

Cellular control is realized by the genes involved in enzyme synthesis[6].

Hormonal control circuitry modulates the enzyme activity in lipid and carbohydrate metabolism[5].

Obesity in pets can have different causes: hypercaloric food or inappropriate in terms of quality and quantity, a sedentary life, hormonal changes that occur with time (castration being the first cause in pets), administering medications that favor excessive fat accumulation. This disease is also influenced by breed, age and gender[12].

Table 1

Optimal weight in animals regarding the breed[13]

Dogs	
Breed	**kg (between)**
Labrador Retriever	32–38
German Shepherd	36–46
Golder Retriever	32–36
Beagle	10–16
Boxer	25–36
Poodle mini	7–10
Shih Tzu	6–9
Cats	
Breed	**kg (between)**
Mixed	6–7
Persian	5–7
Siamese	4–7
Maine Coon	7–13

Once occurred, obesity can lead to type II diabetes because of the event called "insulin resistance", type II diabetes rises a big issue in cats, as well as in humans (amyloid deposition).

Type I diabetes (insulin-dependent) is cause by an insufficient insulin secretion. It occurs, usually, as an auto-immune disease, by developing antibodies as opposed to some components in ß or auto-insulin cells[6, 7].

In type II diabetes (non-insulin dependent), insulin secretion is normal, but tissue resistance occurs to insulin by the absence of insulin receptors[4].

MATERIALS AND METHODS

The study took place over 10 months (October 2014 to July 2015) in the Medical Clinic of the Faculty of Veterinary Medicine in Bucharest, on a number of 43 cats and 28 dogs belonging to different breeds, both males and females.

Table 2

Patients taken in study

Nr. crt.	**Species**	**Total**	**Gender**	**T II D**	**T I D**	**Hyper-glicemia**	**Over - weight**	**Obesity**	**Blood test**	**Ultra sound**
1	Cats	43	M – 29 F – 14	30	8	5	8	35	43	20
2	Dogs	28	M – 9 F – 19	15	6	7	7	21	28	15

After a detailed anamnesis and a complete clinical examination, laboratory examinations were conducted: biochemical blood examination, complete blood count and urinalysis (summary and sediment). Subsequently, we used ultrasound examination of the abdominal cavity.

In most cases, eye and cardiology examinations were performed in order to detect possible complications arising after installation and development of diabetes.

Every patient had their glycemic curve made in order to observe variations during the day. Depending on the case, we determined insulinemia and/or fructosamine[1].

In patients with diabetic neuropathy, we resorted to a neurological examination.

Each animal was weighed during their first visit followed by the same procedure for every inspection in the time mentioned. For the animals taken in study, I periodically measured the thorax and abdominal diameters.

Obesity assessment was realized in accordance with specialized literature. The quantity of fat was identified both by palpation in the ribs area and on a scale from 1 to 5. Therefore, on the first level, the animal is cachectic (more than 20% under normal weight), on the second level, the animal is skinny (10–20% under normal weight), on the third level the animal has normal weight, on the forth level, the animal is overweight (8–10% over normal weight) and on the fifth level, the animal is obese (with over 20% over normal weight)[15].

All investigation were conducted in the Faculty of Veterinary Medicine of Bucharest.

RESULTS AND DISCUSSIONS

I took in study a number of 43 cats and 28 dogs belonging to different breeds and ages (5–10 years old). The patients were both male and female, neutered and not neutered.

We mention the fact that we cannot evaluate in a fair percentage the neutered and not neutered patients because during the time of the study, castration was imposed to some patients. At the end of the study, only three male dogs were not neutered (33.33%).

Patients were divided in 3 categories, because they were diagnosed with:

1. Obesity and type I diabetes:
   - 30 cats out of 43 fit into this category (69.76%), 18 males (60%) and 12 females (40%).
   - 15 dogs out of 28 fit into this category (53.57%), 5 males (33.33%) and 10 females (66.66%).
2. Obesity and type II diabetes:
   - 8 cats out of 43 fit into this category (18.60%), 6 males (75%) and 4 females (25%).
   - 6 dogs out of 28 fit into this category (21.42%), 2 males (33.33%) and 4 females (66.66%).
3. Hyperglycemia:
   - 5 cats out of 43 fit into this category (11.62%), all male (100%).
   - 7 dogs out of 28 fit into this category (25%), 2 males (28.57%) and 5 females (71.42%).

Table 3

Categories of patients

Crt.	Diagnostic	Cats	Dogs
1	Obesity and type I diabetes	M – 18 / F – 12	M – 5 / F – 10
2	Obesity and type II diabetes	M – 6 / F – 2	M – 2 / F – 4
3	Hyperglycemia	M – 5 / F – 0	M – 2 / – 0

All animals taken in study were overweight or obese. All patients with 20% over normal weight were considered obese, and those with 8% over normal weight, were considered overweight.

Results in animals with diabetes were interpreted according to normal glycemia in dogs and cats, being 70–120 mg/kg.

For those with hyperglycemia over 180 mg/dL ("a jeun" glycemia), the established treatment included plant based hypoglycemiants (Fitodiab), specific diet for diabetes or diabetes and obesity for those overweight. Patients were subjected to physical exercise 30 minutes every day in order to re-balance both their weight and glycemia. These patients are potential diabetics, the owners being supposed to always monitor their weights, administer a corresponding diet and periodically sample "a jeun" glycemia.

The second category included obese or overweight animals with glycemia between 180–330 mg/dL, which fits into type II diabetes category (non-insulin dependent). These were treated with hypoglycemiants, the most usual with Diaprel 5 mg/kg twice a day. It is the hypoglycemiant tolerated the most by dogs and cats. Diet and exercise were imposed for the first category as well.

The third category included obese patients with "a jeun" glycemia between 330–600 mg/dL or higher. These were classified in the type I diabetes (insulin-dependent), but they also showed impressive values regarding cholesterol and triglycerides. The established treatment included Mixtard-30 insulin, two times a day or Lantus insulin in the afternoon. Only one patient was treated with Caninsulin insulin, in the morning, the dose of insulin used being 0.25–0.5 UI/kg/day/cat and 0.5–1 UI/kg/day/dog. I recommended food for diabetes and food for weight loss. In order to reduce cholesterol, I used natural products or statins for those with extreme figures. These benefited of treatments with hepatoprotectives.

In all cases, patients drank their diabetes tea 10 ml/kg/day, the meals were divided into 5 courses (7–7:30, 12–12:30, 16–16:30, 19–19:30, 22–22:30). Hypoglycemiants and insulin were administered at 7–7:30 and 19–19:30[2,3].

Patients taken in study were called for check-up periodically.

For each re-examination, we checked up both the body weight and glycemia for each patient. We did not determine the weight index, but we measured the thorax and abdominal diameters.

Patients who respected the treatment, diet and physical activity had very good results, regarding glycemia and obtaining a weight close to normal.

The eye examination was necessary to evaluate retinal vessels, ocular tension and precence of cataracts. It is necessary for establishing an appropriate treatment and quick before desease onset.

Determining insulin and/or fructosamine helped us develop a correct treatment but, also, to check the body response to the treatment. Insulinemia was determined in patients with values situated between type I and II diabetes. According to the results, the treatment with insulin was begun or not.

Fig. 1. Feline, European breed, 8 years old, spayed female – with obesity and type II diabetes.

Fig. 2. Canine, German Boxer breed, 10 years old, unspayed female – obesity, type I diabetes, arthritis and mammary tumors.

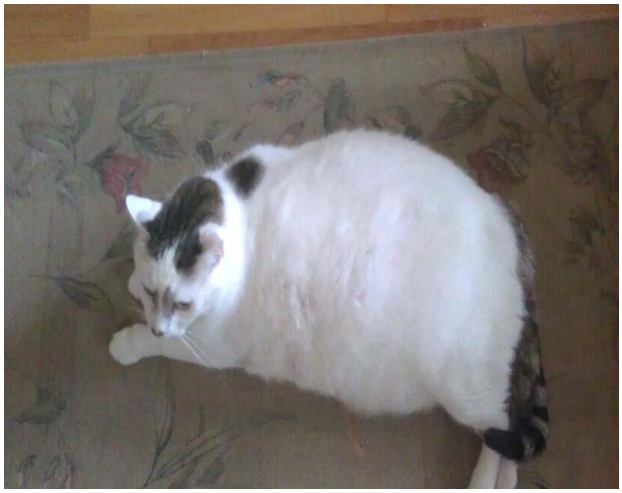

Fig. 3. Feline, European breed, spayed male – overweight, type I diabetes.

Fig. 4. Canine, Mixed breed, 8 years old, spayed male – obesity and type I diabetes.

CONCLUSIONS

All patients taken in study were overweight or obese and had "a jeun" glycemia over the admitted level of 120 mg/dl. Signs of diabetes occurred because of the insulin-resistance event.

The cats that returned to normal weight (diet, physical activity and medical treatment) showed normal glycemia. It is the only species in which diabetes can resolve spontaneously, but they remain potentially diabetic.

Obesity is more frequent in neutered animals.

The occurrence of diabetes in dogs and cats is favored by genetic predispositions, weight, age, breed and gender.

Type II diabetes is more common in cats, while type I diabetes is more frequent in dogs, but depends on when the animal is presented to the doctor.

Usually, in veterinary medicine, the most important sign shown my patients with diabetes is polyuria/polydipsia, which is easy to spot by owners. Majority of these is obese and, when presented to the doctor, the owner remarks a light form of weightloss.

Results of the treatment for diabetes are influenced by body mass and physical exercise.

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