

STUDY ON OBESITY, NUTRITION AND METABOLIC DISEASES ASSOCIATED WITH OR EXACERBATED BY OBESITY IN CATS - A REVIEW

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Abstract

Advancement means changing and improving the perspective, by conducting this study we draw attention to overweight and the diseases that may be associated or caused by obesity. The main metabolic disorders of feline populations are reviewed, statistics and studies conducted since the '90s provide an overview of what extra pounds mean for a cat. The study is about the increase in the frequency of obesity cases but also about the ailments that can be generated by being overweight and maintaining this condition. Diabetes mellitus and feline hepatic lipidosis are two of the most common metabolic changes and endocrinopathies caused by obesity in cats. The article discusses also the prediabetic stage, called by specialists - insulin resistance. The main conclusion of this study is the importance of nutrition as a pillar of preventive medicine.

Key words: obesity, metabolic diseases, diabetes mellitus

INTRODUCTION

Obesity is a true ailment and is believed to be the most common form of pet malnutrition in western societies. Extensive studies in the United Kingdom and the United States indicate that the prevalence of obesity in cats is between 25 and 35% [2].

Researchers define obesity as "a disease in which excessive body weight has accumulated to the point where health is adversely affected [12]

Although obesity appears as the central condition in this study, in addition to obesity, nutritional diseases and metabolic changes associated or exacerbated by obesity in cats were also discussed, such as diabetes, hepatic lipidosis, and insulin resistance [13].

In the Encyclopaedia Britannica, the nutritional disease is defined as any of the diseases and conditions related to the nutrients that cause disease. These may include deficiencies or excesses in diet, obesity and eating disorders, as well as chronic diseases such as cardiovascular disease, hypertension, cancer, and diabetes [23].

The diagnosis of the "nutritional disease" is generally easy, based on clinical manifestations, but more difficult to specify is the etiopathogenesis of the disease, so malnutrition is also considered [7].

Malnutrition is defined by Weiniger as a condition that results from a prolonged deficiency - or excess - of total energy or specific nutrients, such as protein, essential fatty acids, vitamins or minerals.

Both doctors and especially animal owners only think about nutritional deficiencies when they hear the term malnutrition. However, in developed societies, malnutrition is usually due to overeating or excessive intake of nutrients.

Obesity caused by consuming excessive levels of fat and calories is a common example of malnutrition in humans and their companion animals [19].

MATERIAL AND METHOD

According to the bibliographic study carried out so far and by consulting the scientific literature, the most common metabolic disorders were observed and monitored, ailments which worsen with the appearance and maintenance of an overweight state in cats.

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In conducting this study, the documentary research/method was used by consulting the literature in the country and abroad.

RESULTS AND DISCUSSIONS

In recent years, lifestyle-related metabolic diseases, such as obesity, hyperlipidaemia, and diabetes, have increased in prevalence in dogs and cats, as well as in humans.

According to a study conducted between 2009-2019 by PFMA (Pet Food Manufacturers Association) - 277 veterinarians in the UK were questioned about the incidence of obesity in pets. In the case of feline populations, veterinarians confirmed an increase in the incidence of obesity from 40% in the first 5 years of the study to 44% in 2019 [25].

Also in the study was observed a poor information of the owners on the ideal body condition of a cat, 68% of them stated that their pet has the right size [25].

Body condition scores for cats and dogs are proposed by the WSAVA (World Small Animal Veterinary Association) and are consulted by veterinarians and nutritionists to classify animals into a sub-ideal, ideal or overweight body score - numbered from 1 to 9 [24].

In the literature we will find values expressed in percentages - values between 15 and 30% (found on the Hill scale of the weight index) which express an "optimal" percentage of body fat in cats [4].

In dogs and cats, as in humans, a distinction is made between being overweight and being obese. Being overweight can be defined as having a body composition in which body fat levels exceed those considered optimal for health.

Thus, obesity is classified into two categories: obesity caused by excessive food consumption and obesity accompanied by health conditions, called pathological obesity in human medicine [16].

Although the problem of obesity seems very simple in terms of energy balance, a multitude of underlying factors could predispose animals to increase body weight but also maintain the state of overweight / obesity, endogenous and exogenous factors that will be presented and discussed (Table 1).

Companion animals lead an increasingly sedentary lifestyle, and the consequence is seen in weight gain and results in a continuous stress on the pancreas, the main organ that regulates through hormones the production of insulin, glucagon and blood glucose [9].

The prediabetic stage of a patient is a metabolic change called insulin resistance.

Insulin resistance occurs when an increased concentration of circulating hormone is required to adequately maintain blood glucose levels. Based on glucose tolerance tests and measured serum insulin levels, insulin resistance appears to be a common feature of both canine and feline diabetes [17].

Accumulation of visceral fat causes insulin resistance and is a risk factor in causing metabolic syndrome, diabetes, hypertension, dyslipidaemia, and some cancers, and overweight and obesity are usually associated with a shorter lifespan [21].

Insulin stimulates the transport of glucose and other nutrients through cell membranes for cellular use and is involved in a number of anabolic processes in the body.

Lack of insulin activity leads to increased blood glucose levels (hyperglycaemia) and the inability of tissues to receive the glucose they need (glucoprivation) [1].

Cats have a unique metabolism among companion animals, which limits their ability to efficiently use large amounts of carbohydrates due to the sugar transport system in the intestinal tract, unable to adapt to different levels of carbohydrates in the diet [5].

Diabetes mellitus is currently one of the most commonly diagnosed endocrine disorders in dogs and pet cats.

More than 80% of cats with diabetes have type II diabetes; the other cases are usually secondary to other conditions such as acromegaly, pancreatitis or neoplasia [17].

Amyloid deposition in the pancreatic islets is a constant histological finding in cats with diabetes. The amyloid is a precipitating product of a pancreatic compound called amylin. Amylin is secreted with insulin and helps maintain normal blood glucose levels by stimulating the breakdown of muscle glycogen [17].

Among the risk factors that can cause diabetes we list: diets rich in carbohydrates, chronic inflammation of the pancreas, iatrogenic factors such as steroids. However, the most important factor of all remains obesity.

In a 2007 study of diabetes in cats, researchers concluded that overweight cats have a 4.6-fold higher risk of developing diabetes than those with an ideal body weight [15]. About 20% of obese cats up to 8 years of age are prediabetic, expressing a low glucose tolerance [18].

Studies in diabetic cats have shown an improvement in glycaemic response as a result of consuming foods with a higher fibre content [3].

A diet high in protein and low in carbohydrates, similar to a normal diet of wild cats, can ameliorate the abnormalities associated with type 2 diabetes in cats [3], [14].

Two studies have been conducted on the administration of low-carbohydrate foods; so that after the administration of moist food (canned) with low carbohydrate content and rich in protein - in 58% of cats the administration of exogenous insulin could be stopped [3], [14]. Also, in practice, there has been a better management of diabetes in cats with food with a high moisture content - the type of wet food.

Hepatic lipidosis is an acquired disorder caused by the excessive accumulation of triglycerides in hepatocytes, which eventually interferes with the ability of the liver to function optimally [11].

Feline hepatic lipidosis is a metabolic syndrome that is found in adult, middle-aged, overweight cats, who suffer from a period of acute anorexia and catabolism or disassimilation [22].

Circulating fatty acids are taken up by the liver, where they are either metabolized for energy or converted into triglycerides and secreted back into the circulation. If the intake of fatty acids in the liver exceeds the liver's ability to oxidize or secrete them, lipidosis develops [20].

Several studies also support the theory that excess liver triglycerides in cats with

hepatic lipidosis come from fatty acids mobilized from adipose tissue [10].

Hepatic lipidosis is relatively common and is usually seen in middle-aged cats with a history of obesity. Females are reported to be twice as likely to be affected by this condition as males, but this may reflect a higher incidence of obesity in the females studied, rather than a true gender difference [6].

Experts in the field also state that sterilized females tend to consume food in larger quantities, which can predispose them to pathological obesity [8].

Table 1 Risk factors for obesity in companion animals

Endogenous factors	Exogenous factors
Genetic predisposition	Level of voluntary activity
Age, gender, reproductive status	External influences that appear in food consumption
Presence of hormonal abnormalities or hypothalamic lesions	Food composition and palatability
	The environment and lifestyle of the animal

Case P., 2011

CONCLUSIONS

Obesity prevention can be achieved through a routine medical check-up but also by following a strict food program, just to minimize the risk of other metabolic diseases.

Proper feeding of cats can prevent or treat nutritional or metabolic disorders that may occur throughout their lives.

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