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ABSTRACT

Background: Cats can be defined as being overweight if their bodyweight is 15% above optimum weight and classified as obese if they are more than 30% above their optimum weight. There is a general agreement among investigators that the incidence of excess body weight in cats is increasing. Obesity has considerable impacts on the health of cats and is linked to a variety of health issues including orthopedic disease, diabetes mellitus and non-allergic skin conditions. The purpose of the present study was to evaluate the relationship between obesity and associated diseases in cats examined at some veterinary practices in Istanbul-Turkey.

Materials, Methods & Results: Data of 2,272 patients examined at four private veterinary practices in Istanbul was studied to reveal the association between body weight and diseases. Information regarding sex, age and neutering status was also considered for each patient. Patients were classified according to their body weight to three groups as lightweight (female: 3.0 kg and under, male: 4.5 kg and under), optimum -weight (female: 3.0-4.5 kg, male: 4.5-5.5 kg) and overweight/obese (female: 4.5 kg and over, male: 5.5 kg and over). Accounting all adult cats treated by the clinics, diagnoses of osteoarthritis, heart diseases, dermatological diseases, hepatic lipidosis, metabolic syndrome - diabetes mellitus, lameness, gastrointestinal diseases, musculoskeletal diseases, neoplasia and urinary diseases were statistically evaluated. Considering data coming from 2,272 cats, which were referred to veterinary practices, 33.12%, were classified as overweight-obese, 40.04% were optimum-weight and 26.84% were lightweight. It was determined that overweight-obese cats were more likely to be diagnosed with osteoarthritis and hepatic lipidosis compared to other groups ($P < 0.05$). Overweight-obese cats were more likely to be diagnosed with gastrointestinal disease and neoplasia compared to lightweight cats ($P < 0.05$).

Discussion: Obesity in cats is very common and the prevalence of combined overweight and obesity has been reported on a range from 20% to 40% in developed countries. Associated with the increasing welfare, as in humans, the incidence of obesity in the pet population is also increasing. The data studied for this research was evaluated with regard to diseases associated with obesity. It was determined that overweight-obese cats were more likely to be diagnosed with osteoarthritis and hepatic lipidosis compared to the other groups ($P < 0.05$). Overweight-obese cats were more likely to be diagnosed with gastrointestinal disease and neoplasia compared to lightweight cats ($P < 0.05$). However, an association between overweight or obesity and heart disease, metabolic syndrome - diabetes mellitus, lameness, musculoskeletal disease or urinary diseases was not found. A percentage of 19.95 of the patients over 2 years of age were classified in the overweight-obese group. These findings require that weight gain needs to be prevented before the animals reach obese status. Dietary management and physical exercise are essential for managing obesity in pets. In this study, it was aimed to explain the importance of weight management in preventing overweight or obesity associated diseases to cat owners by using the results, which demonstrate that overweight or obese animals are statistically more likely to develop associated diseases. Veterinary practitioners can also use this data to strongly advocate for the maintenance of feline patients at ideal body condition.

Keywords: feline nutrition, overweight/obesity, diseases.

INTRODUCTION

Obesity is a medical condition in which excessive amounts of adipose tissue in the body that it may have some negative effects on the health of companion animals [2,12,14,21]. Although incidence estimates vary depending upon the population that is surveyed and the methodology used, there is consensus that between 20% and 40% of cats living in homes are overweight or obese in developed countries [1-5,13,18,21]. Associated with the increasing welfare, as in humans, the incidence of obesity in the pet population is also increasing.

The relationship between obesity and the development of diseases in cats is of much clinical interest, but has been the subject of limited research. In order to determine the prevalence rate of overweight/obesity of cats in Japan, 190 cats were examined, out of which 14% were overweight while 42% were obese, with an overall prevalence rate of 56% for being overweight/obese [15].

Obesity in cats is associated with an increased risk of medical complications, such as diabetes mellitus, orthopedic disease, and non-allergic skin conditions [7]. Furthermore, a number of metabolic changes occur, which may not be obvious on routine clinical or laboratory evaluation. For example, obesity can induce a low-grade inflammatory response [8,20]. It is therefore highly important for clinicians and owners regularly to monitor weight changes and initiate proper action to prevent or treat unwanted weight gain.

Many clinical veterinarians in Turkey feel that feline obesity is increasing in prevalence within Turkey. However, there is no available data regarding domestic overweight or obese cats being readily available in Turkey. The aim of the present study was to evaluate the relationship between overweight/obesity and associated diseases in cats examined at some veterinary practices in Istanbul-Turkey.

MATERIALS AND METHODS

Animals

Data of 2,272 patients examined at four private veterinary clinics in Istanbul-Turkey during 2014 and 2015 was studied to reveal the association between body weight and diseases. Information regarding sex, age and neutering status was also considered for each patient. Patients were classified according to their body weight into three groups as lightweight (female: 3.0 kg and under, male: 4.5 kg and under), optimum-weight (female: 3.0-4.5 kg, male: 4.5-5.5 kg) and overweight/obese (female: 4.5 kg and over, male: 5.5 kg and over). Accounting all adult cats treated by the clinics, diagnoses of osteoarthritis, heart diseases, dermatological diseases, hepatic lipidosis, metabolic syndrome – diabetes mellitus, lameness, gastrointestinal diseases, musculoskeletal diseases, neoplasia and urinary diseases were statistically evaluated.

Statistical methods

The adult cat population was defined as animals over 1 year of age; analyses were conducted on cats that had at least one diagnosis (including "Healthy") of any kind recorded over the study period. Associations between body weights and diseases were evaluated using the χ^2 test (Chi-square analyses). The significance level was set at $P < 0.05$.

RESULTS

A total of 2,772 adult cats along with their reported body weights from four clinics were included in this study. 1,574 of these cats were "healthy" animals without any diseases and 1,198 cats were reported to have at least one disease in category. According to the data of 2,772 cats that were referred to veterinary polyclinics, 26.84% (744 cats) were lightweight, 40.04% (1110 cats) were optimum-weight and 33.12% (918 cats) were overweight-obese (Data not shown).

Prevalence of individual disease and disease categories according to their body weight is detailed in Table 1. It was determined that overweight-obese cats were more likely to be diagnosed with osteoarthritis and hepatic lipidosis compared to other groups ($P < 0.05$). Overweight-obese cats were more likely to be diagnosed with gastrointestinal disease and neoplasia compared to lightweight cats ($P < 0.05$) [Table 1].

Dermatological diseases, urinary disease, and gastrointestinal disease were the most common diseases for overweight/obese female cats and urinary disease, dermatological diseases, and gastrointestinal disease were the most common diseases for overweight/obese male cats included in this analysis, respectively (Table 2). It was determined that neutered overweight-obese female and male cats were more likely to be diagnosed with diseases compared to intact overweight-obese female and male cats, in this study (Figure 1).

Table 1. Disease and disease category* prevalence by body weight category for adult cats (n = 1,198).

Disease	Light weight n = 295		Optimum weight n = 440		Overweight/obese n = 463		P Value
	n	%	n	%	n	%	
Osteoarthritis	0	0.0b	2	0.2b	8	0.9a	0.006
Heart disease	7	0.9	18	1.6	12	1.3	0.455
Dermatopathy	80	10.8ab	103	9.3b	127	13.8a	0.005
Hepatic Lipidosis	4	0.5b	3	0.3b	20	2.2a	0.001
Diabetes Mellitus	12	1.6	29	2.6	24	2.6	0.304
Lameness	2	0.3	14	1.3	7	0.8	0.067
Gastrointestinal Disease	84	9.2b	128	11.5ab	104	14.0a	0.009
Musculoskeletal Disease	0	0.0	1	0.1	2	0.2	0.394
Neoplasia	1	0.1b	7	0.6ab	13	1.4a	0.009
Urinary Disease	105	14.1	135	12.2	146	15.9	0.052

*Cat was reported to have at least 1 disease in category. a-bMeans within columns with different superscripts, differ significantly important. ($P < 0.05$).

Table 2. Disease and disease category* prevalence by body weight category for female and male cats.

Disease	Female			Male		
	Lightweight ≤ 3.0 kg	Optimum-weight 3.0-4.5 kg	Overweight/obese 4.5 kg ≥	Lightweight ≤ 4.5 kg	Optimum-weight 4.5 -5.5 kg	Overweight/obese 5.5 kg ≥
Osteoarthritis	0	2	3	0	0	5
Heart disease	1	8	4	6	10	8
Dermatopathy	27	54	53	53	49	74
Hepatic Lipidosis	1	1	10	3	2	10
Diabetes Mellitus	7	20	10	5	9	14
Lameness	1	7	1	1	7	6
Gastrointestinal Diseases	42	81	44	42	47	60
Musculoskeletal Disease	0	0	1	0	1	1
Neoplasia	0	3	6	1	4	7
Urinary Disease	19	44	46	86	91	100

*Cat was reported to have at least 1 disease in category.

DISCUSSION

Out of 2,772 cats examined in the study, 26.84% (744 cats) were lightweight, 40.04% (1110 cats) were optimum-weight and 33.12% (918 cats) were classified as overweight-obese (Data not shown). The results of the present study are in line with the results of a previous study which reported 35% overweight and obesity in adult cats seen by US veterinarians during 1995 [13]. However, obesity rate in some other studies in the United Kingdom (52%) [17], and in Japan (56%) [15], are nearly double. For cats, as for humans, obesity is a multifactorial problem, and some of the factors are similar between the species. A number of potentially related risk factors may be relevant including genetics, sex status, age, owner characteristics and behaviors [3]. It has previously been shown that owners tend to underestimate the condition of their pet, especially if the pet is overweight [11]. Living a sedentary lifestyle, along with being overfed highly palatable and energy-dense foods, may also be important contributing factors [21].
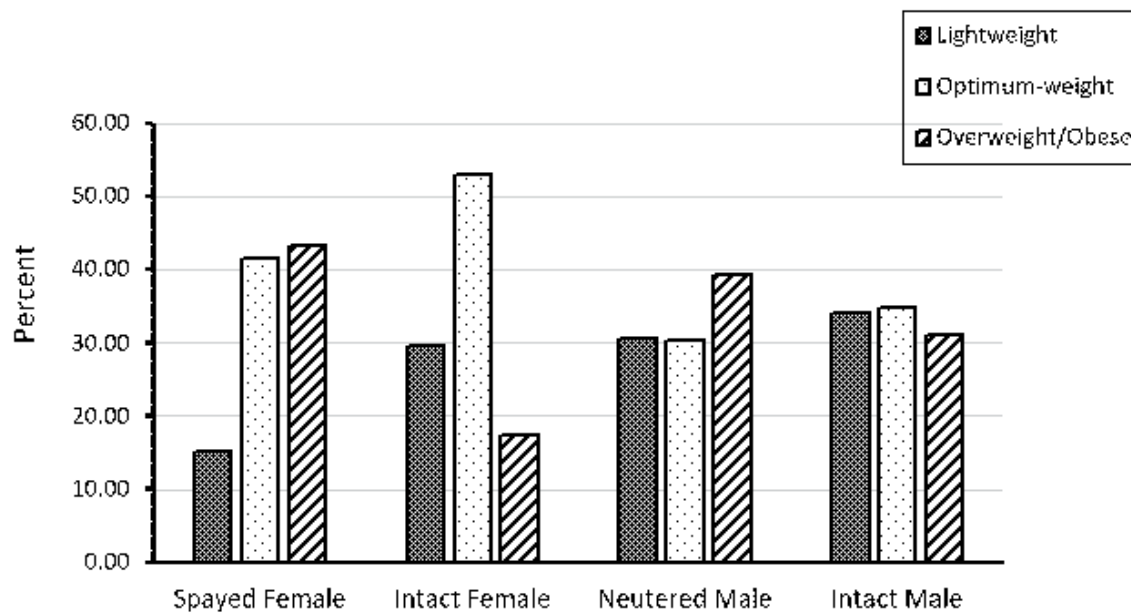
Figure 1. Prevalence of body weight category by gender for adult sick cats.

In cats, obesity is a strong risk factor for the development of diabetes as it results in insulin resistance and hyperinsulinemia [16]. Obese cats were found to be 3.9 times more likely to develop diabetes, 4.9 times more likely to develop lameness and 2.3 times more likely to have non-allergic skin conditions, compared to cats of optimal body condition [19]. However in this study, it was determined that overweight-obese cats were more likely to be diagnosed with osteoarthritis and hepatic lipidosis compared to other groups ($P <$ 0.05). In addition, overweight-obese cats were more likely to be diagnosed with gastrointestinal disease and neoplasia compared to lightweight cats ($P < 0.05$) [Table 1]. The study reported here has been accomplished with the use of computerized information systems by private veterinary clinics. Therefore, these information systems are based on an accounting paradigm.

Dermatological diseases, urinary disease, and gastrointestinal disease were the most common diseases for both female and male cats included in this analysis (Table 2). Overweight cats are at increased risk for urinary tract diseases; however, a relationship between obesity and urinary diseases as a category was not found, possibly due to lack of statistical power.

Neutering is an important risk factor for obesity in cats; many studies suggested that this is due to a decrease in metabolic rate after neutering [6,10]. Although, increased fat mass is usually present in neutered animals; when energy expenditure is expressed on a lean mass basis; no difference in metabolic rate is no-

ted between neutered and entire individuals [9]. It was determined that neutered overweight-obese cats were more likely to be diagnosed with diseases compared to intact overweight-obese cats, in this study (Figure 1).

In conclusion, our findings demonstrate that the prevalence of obesity in cats was high within a population of cats visiting a veterinary practice and dermatological diseases, urinary diseases, and gastrointestinal diseases were the most common diseases for overweight/obese cats. With the results of this study, veterinarians should be able to better focus on what is important for the cat population. However, the results of the prevalence analyses need to be interpreted with caution, as the study population may not necessarily be representative of the general population throughout Turkey. Electronic tools for capturing data and information systems are becoming increasingly sophisticated; perhaps with the adaptation of fully integrated information systems, these type of studies will be more feasible.

CONCLUSION

Obesity is a growing concern in household pet animals, and the increasing incidence appears to be mirroring the trend observed in their owners. The major medical concern of obesity relates to many diseases and disease categories that accompany adiposity. These conditions not only shorten the expected lifespan of the affected animals, but also reduce their health-related quality of life. Therefore, there is a need to increase

awareness within the veterinary profession and pet owners that obesity in companion animals is a serious medical concern.

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