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An overweight/obesity survey among dogs and cats attended at a veterinary teaching hospital during the second year of the COVID-19 pandemic

[*Uma pesquisa sobre sobrepeso/obesidade em cães e gatos atendidos em um hospital veterinário escola durante o segundo ano de pandemia de COVID-19*]

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ABSTRACT

Anecdotal reports suggest that the new coronavirus SARS-CoV-2 pandemic (COVID-19) has increased overweight and obesity prevalence in dogs and cats. The present report aimed to perform a retrospective overweight/obesity survey on 1,001 consecutive cases attended in the Veterinary Clinics Hospital from the Federal University of Rio Grande do Sul during its reopening to the public after months closed due to the pandemic. The overall overweight or obesity observed prevalence was 36.63%; being the frequency in cats slightly greater (38.37%) than compared to dogs (35.76%). No local increase in these frequencies was detected. Neutering (dogs and cats), age greater than 10 years (dogs), and male gender (cats) were factors associated with overweight/obesity. Bodyweight was not registered in about 30% of the medical records, while the body condition score was not registered in about 50% of the cases. These flaws were more often observed in feline medical records and efforts to improve these data records are warranted.

Keywords: coronavirus, nutritional disturbance, risk factors, obesity, dogs and cats

RESUMO

Especula-se que a pandemia pelo novo coronavírus SARS-CoV-2 (COVID-19) tenha agravado a prevalência de sobrepeso e obesidade em cães e gatos. O presente artigo teve como objetivo realizar um levantamento de sobrepeso/obesidade, o qual avaliou os registros de 1001 casos consecutivos atendidos no Hospital de Clínicas Veterinárias da Universidade Federal do Rio Grande do Sul, durante a reabertura da instituição ao público, após meses fechada devido à pandemia. Observou-se uma prevalência de sobrepeso ou de obesidade de 36,63%, sendo a frequência ligeiramente maior em gatos (38,37%) do que em cães (35,76%) e não sendo documentado aumento local na prevalência. Castrações (cães e gatos), idade > 10 anos (cães) e sexo masculino (gatos) foram associadas ao sobrepeso/obesidade. Em cerca de 30% das fichas não havia peso registrado, e em cerca de 50% não havia registro de ECC. Essas falhas foram mais frequentes em fichas de felinos e demandam medidas para aumentar o registro desses dados pelas equipes clínicas.

Palavras-chave: coronavírus, distúrbio nutricional, fatores de risco, obesidade, cães e gatos

INTRODUCTION

Obesity is defined as an excessive adipose tissue depot in the body, leading to important hormonal and metabolic alterations in dogs and cats (Zoran, 2010). The main aspect of obesity pathophysiology is the positive energy balance; however, genetics, aging, gender, gonadal and hormonal status also play a role (Loftus and Wakshlag, 2015). Overconsumption of treats and unbalanced diets, as well as sedentarism, are also known obesity risk factors for dogs and cats (Zoran, 2010; German *et al.*, 2012; Salt *et al.*, 2019).

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Overweight and obesity are often misleading in the literature; however, obesity is accepted as being at least more than 30% above the ideal body weight (BW), while overweight describes animals with BW less than 30% above the ideal (Cline *et al*., 2021; Pegram *et al*., 2021). Many methods can be used to determine dogs' and cats' body conditions, and the use of the body condition score (BCS) has become the simplest valid method to estimate body fat percentual and the patient's overweight/obesity degree (Laflamme, 2006; Cline *et al*., 2021).

The COVID-19 pandemic impacted population circulation and animal health. Anecdotal reports suggest an increase in obesity prevalence since the pandemic began (VetReport, 2020; Tursi, 2020). With the owners spending more time at home, dogs and cats had their routines impacted, and a theoretical reduction in physical activities regarding the dogs and cats used to walk outside on a leash. Moreover, feeding patterns could have changed, with increased exposure to treats as a form of reward and pleasure on the part of tutors (VetReport, 2020; Tursi 2020). This study aimed to assess overweight/obesity frequency in patients who attended the Veterinary Clinics Hospital from the Federal University of Rio Grande do Sul (HCV-UFRGS) during the pandemic's second year when public-open activities were restored, after months closed to the external public, due to containment measures against the pandemic.

MATERIAL AND METHODS

A total of 1,001 consecutive dogs' and cats' medical records attended after Hospital's reopening between 2021 May to September were analyzed. An Excel (Microsoft®) sheet was built to register species, breed, gender, age, gonadal status, BW, nine points BCS scale according to Laflame (2006), and the main complaint for the veterinary visit. Patients with BCS 6-7/9 were considered overweight, while BCS 8-9/9 were considered obese. Data was obtained after an individualized search in the medical records' electronic system (SimplesVet®), followed by a manual search in physical archives at the Hospital's Medical and Statistic Service Archive (SAME) when data of interest were not registered at the electronic system. Descriptive statistics were run, and the odds ratio (OR) and the respective 95% confidence intervals (95%CI) were determined to evaluate the association between the overweight/obesity state and age, sex, and gonadal status in dogs and cats with the program Prism-GraphPad (version 7.0). The present study was approved by the Ethics Committee in Animal Experimentation (CEUA/UFRGS) (project nº27320) and authorized by Hospital Directors.

RESULTS

A total of 1,097 medical records were reviewed to reach 1,001 consecutive new dogs' or cats' consultations. Ninety-six charts (8.75%) were consultations regarding other species, being: 31 birds in general, 12 equines, 10 possums, 9 rabbits, 8 bovines, 5 Guinea pigs, 5 chelonians, and another six mammalian species (a howler monkey, a deer, a mouse, an urchin, a pig, an otter, one of each). From de total of 1,001 analyzed charts, 612 (61,13%) were dogs' consultations, while the cats' totalized the remaining 389 (38.87%). Attended dogs and cats were mostly mongrels (48.7% and 94.5%, respectively). The main breeds represented among dogs were Dachshund (6.4%), Yorkshire (6.1%), Shi Tzu (5.2%), and Boxer, Pinscher, and Poodle (3.1% each), followed by another 29 breeds (24.3%). Among cats, Maine Coon, Siamese, and Persian (1.8% each) were the only breeds reported.

Among dogs and cats, 680/1,001 patients (67.93%) had their BW recorded, being 469/612 dogs (76.6%) and 211/389 (54.2%) cats. Only 516/1,001 patients had their BCS recorded, representing 56.2% of the dogs, and 44.2% of the cats. Table 1 shows the frequency of patients with BCS below 5/9, as well as respective scores equal to or above 6/9 in the dogs and cats evaluated in this case series. A 36.6% overweight/obesity prevalence was observed. This prevalence was slightly greater in cats (38.4%) in comparison with dogs (35.8%) but not significant ($P<0.05$). No statistically significant association with overweight/obesity was found for any breed reported in the study.

Table 1. Frequency of dogs and cats with body condition scores (BCS) indicative of overweight and obesity during the reopening of the HCV-UFRGS after months closed due to the COVID-19 pandemic.

	Body Condition Scores (BCS) Ranges				
	1-5/9 (Control)	6-7/9 (Overweight)	8-9/9 (Obesity)	BCS N/R	Total
Dogs	221 (64.2%)	96 (27.9%)	27 (7.9%)	268 (43.8%)	612
Cats	106 (61.6%)	51 (29.7%)	15 (8.7%)	217 (55.8%)	389
Total	327 (63.4%)	147 (28.5%)	42 (8.1%)	485 (48.5%)	1001

*N/R: non-recorded.

Regarding age, gender, and gonadal status data, from the 189 patients identified as overweight/obese, 99 (52.4%) have less than ten years old, while the remaining 47.6% are age more than ten. However, the majority (66.5%) of animals with BCS among 1-5/9 have less than 10 years. The male gender was documented in 30.1% of the dogs with overweight/obesity while among cats, tomcats represented 62.1% of the overweight/obese cases. With respect to the gonadal status, 83.1% of the patients identified as overweight/obese were neutered; however, among patients with BCS 1-5/9, only 62.5% were neutered animals. Table 2 shows OR and 95%CI results from the correlations among overweightness and age, gender, and gonadal status in the studied population.

Table 2. Correlations (OR and 95%CI) between overweightness, evaluated by means of registered BCS during veterinary consultation, and potential risk factors (age, gender, gonadal status) in dogs and cats attended during the reopening of the HCV-UFRGS after months closed due to the COVID-19 pandemic.

Variable	Odds ratio	95%CI	P < 0.05
Dogs			
> 10 years old	2.09	1.32 – 3.30	Yes
Male gender	0.63	0.39 – 1.02	No
Neutered	2.40	1.45 – 3.97	Yes
Cats			
> 10 years old	1.42	0.73 – 2.75	No
Male gender	1.98	1.05 – 3.71	Yes
Neutered	8.16	2.36 – 28.15	Yes

Finally, regarding missing BW and BCS data in medical charts, dogs had a greater probability of having their weight registered (OR = 2.76, 95%CI = 2.1 – 3.63, P < 0.05) when compared to cats. Negligence with BCS recording was also higher among cats. Dogs had a greater probability of having their BCS registered in medical charts when compared to cats (OR = 1.61, 95%CI = 1.25 – 2.09, P < 0.05).

The main complaints reported by the owners in this case series were basically related to tumors (19.3%), trauma/ambulation (15.5%), and emesis/diarrhea (7.4%); followed by many other different subcategories (59.8%) including complaints regarding cardiorespiratory signs, vaccines, spaying, and aleatory surgeries.

DISCUSSION

The most relevant finding among dogs and cats seen at the Veterinary Hospital from 2021 May to September, despite being extremely worrisome, was the fact that one in every three patients did not have its BW recorded on the medical chart, and that half of the patients did not have its BCS recorded. More alarming is the evidence that cats are more prone to these register flaws. It is important to emphasize that the data herein reported does not allow the assumption these fundamental parameters in health evaluation were not measured. However, not registering them configures a recurrent fault among veterinarians. Unfortunately, BW is one of the health parameters most neglected in veterinarian medical charts worldwide (Kipperman and German, 2018; Pegram *et al.*, 2021).

A global initiative whose aim is to promote a standard definition of obesity, allowing an increase in awareness and discussion on this topic, has been proposing obesity should be considered a disease (Ward *et al*., 2019). The disease state of obesity is because; 1) the overweightness is not under the patient's control, 2) there are several known risk factors and pathogenic mechanisms related to obesity, 3) excessive adiposity disrupts homeostasis and predisposes to diverse comorbidities, and 4) obesity negatively impacts life quality and life span (German *et al*., 2012; Salt *et al*., 2019; Ward *et al*., 2019).

In this sense, when an owner takes his pet to the Veterinarian expecting health promotion for the animal, it is the Vet's obligation to monitor and advise the owner about undesirable BW variations, educate and guide the owners about the serial benefits of keeping the pet's BCS eutrophic, and to indicate the need for losing weight in face of an overweight/obesity diagnosis (Kipperman and German, 2018; Cline *et al*., 2021). Notwithstanding, do not record BW or BCS makes it difficult for the patient's health to monitor and avoid up (i.e., undesired weight gain after elective spaying) and down (i.e., cancer and cardiac insufficiency cachexia, or even aging sarcopenia) weight fluctuations to be identified (Cline *et al*., 2021).

Nutritional evaluation is nowadays considered the fifth primordial vital signal to be evaluated in a Vet consultation together with body temperature, pulse, breathing, and pain by the World Small Animal Veterinary Association. Actually, BW and BSC are essential parts of an adequate nutritional evaluation (Cline *et al*., 2021). Careless with BW and BCS recording and monitoring also configures omission with regard to the role of Veterinarians in the one health perspective (Day, 2017).

Serial evidence points out that when a Vet educates a pet owner about overweightness in dogs and cats there is a potential for the owner to start to care for his BW, feeding, and life behaviors since humans and pets share many environmental risks factors for obesity, such as sedentarism and feeding patterns (Muñoz-Prieto *et al*., 2018; Pogány *et al*., 2018). Moreover, obesity associated with metabolic syndrome is frequent in obese dog owners (Montoya-Alonzo *et al*., 2017). Therefore, proper guidance and motivation for these owners to join dog weight loss programs may help them to better care about their own health and weight. In this way, this weight care management with the dog can impact owners' health reducing the risk of type-2 diabetes mellitus and cardiovascular disease risk in the future, two common outcomes in people with metabolic syndrome (Saklayen, 2018).

Several comorbidities can result from obesity in dogs and cats (i.e., diabetes mellitus, osteoarthrosis, hepatic lipidosis, cardiorespiratory commitment, mammary neoplasia, and dyslipidemia, among others) as well as many clinical entities can acquire greater morbidity in the presence of obesity (i.e., brachycephalic syndrome, intervertebral disk disease, osteoarthrosis, insulin resistance, and others) (Zoran, 2010). Thus, overweight/obesity misdiagnosis due to BW and BCS lack of registration in medical charts not just restrains patients' access to weight loss programs that could prevent future diseases, but also can cause unnecessary costs in investigating obesity-associated clinical and laboratory abnormalities (i.e., dyslipidemias, increased serum alkaline phosphatase activity, hypertension, hyperglycemia, and exercise and/or heat intolerance).

Many causes could explain the low BW and BCS registration levels in the studied medical charts. Unfamiliarity with the BCS system is a potential cause, as well as Vet's insecurity in attributing a BCS, or even personal Vet's issues to his own weight. However, simple forgetfulness could happen in some cases since the routine in the referred Hospital is intense and full of defiant clinical cases and emergencies making the veterinarian's attention prioritized registering other information than BW or BCS. Even so, this would not be an acceptable justificative given the importance of BW registration for drug dose calculations and monitoring during hospitalization. Moreover, both printed and electronic propaedeutical sheets request BW and BCS filling.

Different Veterinary categories are involved with HCV/UFRGS customer service, including residents from first and second years, hired veterinarians, post-graduating students (master's and doctoral degrees), and professors. Despite

most of the dogs' and cats' consultations being performed by the residents, evaluating omission scores by profession category was beyond the scope of this report. Another relevant question is the fact some specialty services charts such as dermatology and ophthalmology, both with a huge casuistic, do not have a field for BW and BCS registration. A recommendation for these services to adopt this data registration is important since many medical problems attended in these specialties can show obesity correlations (Zoran *et al*., 2010; Loftus and Wahshlag, 2015).

Overweight and feeding are considered sensitive topics to be aborded with pet owners, and many veterinarians do not feel adequately prepared for these conversations (Churchill and Ward, 2016; Cline *et al*., 2021). In fact, unconsciously, this could affect the attention given to BW and BCS registration. Moreover, the COVID-19 pandemic also can have a role in this scenario. Evidence suggests the way veterinarians deal with sensitive topics has worsened due to the serial stressors related to the pandemic (Quain *et al*., 2021). In contrast, evidence also points out the tutor-animal bond has tightened during the pandemic and then, a growing requisition and exigence for health care by the owners are expected, including worries about pets' BW, quality of life, and life span (Applebaum *et al*., 2020).

The fact cats were more prone to have their BW and BCS neglected is a result still difficult to discuss. Unfamiliarity with the species or with the specific Hospital's feline medical chart could be potential triggers for this fault. However, eventually, there is a perception by Veterinarians that cats' size phenotypes do not vary too much as occurs with dogs, justifying less attention to the register of these two basic data. It is important to emphasize cats demand adequate health care in all life stages, and proper care with BW and BCS is indicated lifelong.

Some considerations must be made regarding overweight/obesity frequency and related factors studied. First, the combined overweight (BCS 6 and 7/9) and obesity (BCS 8 and 9/9) frequency observed in the study are similar to data reported in other Brazilian cities and worldwide (Diez and Nguyen, 2006; Lund *et al*., 2006; Muñoz-Prieto *et al*., 2018; Porsani *et al*., 2020); however, smallest than reported at Canarias (Montoya-Alonzo *et al*., 2017), and greatest than at the United Kingdom (Pegram *et al*., 2021). Curiously, the increased overweightness prevalence due to the COVID-19 pandemic hypothesis was not confirmed. Actually, the results observed in this study were slightly smaller than the data previously reported on the HCV/UFRGS. A study conducted between 2015 and 2017 with an aleatory presential evaluation of dogs under consultation at the Hospital reported a 42% prevalence of overweight and 10% of obesity, with a net overweightness (BCS > 5/9) of 52% of the dogs seeing at the institution ((Ferreira *et al*., 2017)). Another study checking feeding habits and overweight/obesity prevalence was conducted in 2017 at the hospital, also evaluating BCS in person by trained interviewers (Machado *et al*., 2017). This survey identified a total of 42.2% of the 701 dogs evaluated and 30.4% of the 92 cats evaluated with BCS 7 or greater on a 9-point scale. The fact dogs and cats with BCS 6/9 have not been considered overweight can actually have underestimated overweightness prevalence.

The differences reported in this study in comparison with previous ones can reflect that despite Hospital reopening occurring during a critical pandemic stage, the owners who were willing to look for a veterinarian did it due to the critical conditions of their pets, corroborating the overweightness underestimation in the hospital population studied in this period. The simple fact of using hospital subjects could underestimate overweight/obesity prevalence due to certain diseases' impact on the BCS (Cline *et al*., 2021). The fact that two out of the three main categories of clinical complaints expressed by the owners were related to tumors and emesis/diarrhea supports this hypothesis. In contrast, obesity-associated diseases may be the cause of Hospital seeking (Zoran 2010; German *et al*., 2012) such as some oncologic cases, and obesity-related ambulatory problems (i.e., osteoarthrosis, cranial cruciate ligament rupture, intervertebral disc diseases). However, a deep view of primary medical complaints, final diagnoses obtained, and eventual association with patients' BCS is beyond the scope of this study.

The retrospective nature of the study evaluating BCS attributed by veterinarians is a limitation that must be addressed. Lack of standardization among different BCS evaluators may be a source

of controversy and information bias (Moresco *et al*., 2017). However, several obesity prevalence studies used the same research method, or more fragile designs, such as asking for the owner to estimate their dog's BCS based on pictures (Muñoz-Prieto *et al*., 2018; Porsani *et al*., 2020; Pegram *et al*., 2021).

Overweightness correlations with well-known risk factors (age, sex, and neutering) were an expected result (Diez and Nguyen, 2006; Zoran, 2010; Loftus and Wahshlag, 2015). Neutering was identified as a significant risk factor in both cats and dogs. In dogs, overweight/obese animals had 2.4 odds to be neutered, while in cats the odds for neutering were eight in comparison with cats with BCS 5 or smaller. Despite no sex adjustment being made in these analyses, the impact of reduced exposure to gonadal hormones is recognized as a risk factor in both gender and species due to reduced metabolic rate and physical activity and increased appetite after neutering (Diez and Nguyen, 2006; Zoran, 2010; Loftus and Wahshlag, 2015; Vendramini *et al*., 2020). Despite some dog breeds may be prone to overweight/obesity (Porsani *et al*., 2020; Pegram *et al*., 2021), no correlation was found between a BCS ≥6 and any breed in our study. In this sense, analysis of a larger number of medical charts would be helpful to look for predisposed breeds in the studied population.

Regarding gender, overweight/obese feline patients have almost two times more chances of being male. This data can be reflecting the neutering impact since 95% of the obese cats in this study were neutered, in contrast with 72% of the control cats. Moreover, seldom will an intact cat achieve a larger life span to the point of becoming obese due to the greater risk for infectious diseases and traumas. Also, tomcat sexual behavior is not well tolerated by most feline owners (Quimby *et al*., 2021) and neutering is strongly associated with sedentarism and increased appetite in male cats when compared with females (Vendramini *et al*., 2020). For the dogs, there was no significant overweight prevalence difference between males and females. However, there was a statistical tendency towards a smaller risk for obesity in male dogs. Once again, this data may be influenced by neutering since male dogs are less exposed to neutering than females (Vendramini *et al*., 2020). This hypothesis is corroborated by the fact that bitches were already characterized at risk for overweight/obesity in other studies (Diez and Nguyen, 2006; Porsani *et al*., 2020).

Age greater than ten years old was considered a significant risk factor for overweightness in dogs and cats. Factors such as reduced metabolic rate and activity level due to aging, as well as chronic effects of feeding tiny amounts of extra calories, help age to be a risk factor for obesity (Lund *et al*., 2006; Porsani *et al*., 2020; Pegram *et al*., 2021). In contrast, aging more than 10 years old does not seem to be a risk factor for obesity among studied cats probably due to the high prevalence of chronic diseases associated with cachexia in cats older than ten such as lymphoma, chronic kidney disease, cardiomyopathies, cancer, and hyperthyroidism (Quimby *et al*., 2021).

CONCLUSIONS

Overweight and obesity prevalence in the dog and cat populations attended at HCV-UFRGS does not seem to be increased due to the impact of COVID-19 on owner and pet routines. Moreover, the correlations identified between overweightness and age in dogs, as well as BCS > 6/9 and male gender in cats or neutering in both species are in accordance with previous data. The fact that about half of the medical records do not have BCS registered and about 1/3 of them do not have BW registered may have influenced the results, however. Cats looked more exposed to the omission of these data in their medical records. The findings herein reported warrant attention and review of the registering procedures with the Veterinarian team seeing patients at the HCV-UFRGS to emphasize the importance of these parameters being adequately registered.

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