



UNIVERSITI PUTRA MALAYSIA

**STUDY OF OWNER AWARENESS AND RISK FACTORS OF FELINE
OBESITY IN KLANG VALLEY**

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STUDY OF OWNER AWARENESS AND RISK FACTORS OF FELINE OBESITY
IN KLANG VALLEY

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CERTIFICATION

It is hereby certified that we have read this project paper entitled “Study of Owner Awareness and Risk Factor of Feline Obesity in Klang Valley”, by Nur Azlin Binti Misran and in our opinion it is satisfactory in terms of scope, quality, and presentation as partial fulfillment of the requirement for the course VPD 4999-Project

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DEDICATIONS

This project paper is dedicated to

My family

Father

Mother

Brother and Sister

And to all those who are directly and indirectly involved in completion
of this project

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Alhamdulillah I would like to thank Allah for giving me strength to finish this project paper.

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LIST OF ABBREVIATIONS

%	Percentage
n	Frequency
BCS	Body Condition Score
<	Less than
>	More than
kcal	Kilocalorie
BW	Body weight
kg	Kilogram
OR	Odd ratio
=	Equal to

ABSTRAK

Abstrak daripada kertas projek yang dikemukakan kepada Fakulti Perubatan Veterinar untuk memenuhi sebahagian daripada keperluan kursus VPD 4901 – Projek

**KAJIAN MENGENAI KESEDARAN PEMILIK KUCING DAN FAKTOR RISIKO
OBESITI DALAM KALANGAN KUCING DI KLANG VALLEY**

Oleh

Nur Azlin Binti Misran

2016

Penyelia : Dr. Puteri Azaziah Megat Abdul Rani

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Satu kajian soal selidik keratan rentas berkaitan pemilik kucing di Lembah Klang telah dilakukan pada Januari 2016. Secara keseluruhan 150 soal selidik telah dikumpulkan. Soal selidik terdiri daripada tiga bahagian: demografi kucing, makanan dan rejim pemberian makanan dan kesedaran pemilik dan pengetahuan mengenai kucing

obesiti. Skor keadaan badan (BCS) kucing telah dibuat oleh pemilik kucing menggunakan skala -lima mata (BCS 1- BCS 5). Objektif kajian ini adalah untuk menentukan tahap kesedaran pemilik haiwan tentang risiko obesiti dan faktor yang menyumbang obesiti dalam kalangan kucing. Data dianalisis dengan menggunakan statistik deskriptif untuk mengenal pasti tahap kesedaran pemilik kucing dan mengetahui bilangan serta peratusan kucing yang mempunyai berat badan berlebihan dan obesiti yang terlibat dalam kajian. Secara keseluruhan, majoriti pemilik kucing mempunyai kesedaran mengenai risiko kucing obesiti (77%) dan peratusan kucing yang mempunyai berat badan berlebihan dan obes adalah 47.4% (n = 71). Berdasarkan kajian literatur, jantina, status pengkasian, umur, baka, pengurusan, bilangan kucing di rumah, jenis pemakanan, kekerapan makan, jumlah makanan yang diberikan, kesedaran pemilik mengenai risiko obesiti dan pengetahuan pemilik kucing tentang jumlah kalori yang diperlukan untuk kucing telah dikenal pasti berpotensi untuk menjadi faktor risiko untuk kucing menjadi obesiti. Oleh itu, ujian khi kuasa dua telah dilakukan untuk menentukan hubungan antara faktor yang berisiko dan peluang untuk kucing mempunyai berat badan berlebihan dan obes ($P < 0.05$). Dalam kajian ini kucing yang mempunyai berat badan berlebihan dan obes lebih cenderung mempunyai hubungan dengan status dikasi, umur kucing, jenis pemakanan, pengurusan dan kekerapan makan. Kemudian regresi logistik binari telah dilakukan untuk mencari faktor risiko utama untuk obesiti kucing. Berdasarkan kepada keputusan, kucing yang telah dikasi, senior (> 9 tahun), makanan komersial, dijaga sepenuhnya di rumah dan makan lebih daripada tiga kali sehari mempunyai risiko yang tinggi untuk menjadi obese. Kajian ini menekankan kepentingan sikap pemilik ke arah

pencegahan obesiti kerana berdasarkan kajian pengetahuan pemilik kucing tentang pencegahan obesiti kucing masih rendah. Oleh itu pendidikan tentang pengurusan makanan dan anggaran BCS adalah penting untuk mengelakkan insiden kucing obes.

Kata kunci: Kucing, Obesiti, keadaan skor badan (BCS), kesedaran pemilik, faktor risiko

ABSTRACT

An abstract of the project paper presented to the Faculty of Veterinary Medicine in partial fulfillment of the course VPD 4901-Project.

STUDY OF OWNER AWARENESS AND RISK FACTORS OF OBESITY IN CAT IN KLANG VALLEY

By

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2016

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A cross-sectional questionnaire study of cat owners in Klang Valley was done in January 2016. In total 150 questionnaires were collected. The questionnaires comprised of three sections: demographics of the cat, feed and feeding regime and owner awareness and knowledge about feline obesity. The body condition score (BCS) of cats was rated by the cat owner using a validated five point scale. The objectives of this study are to determine the level of awareness of pet owner about the risk of obesity in cat and to determine factors that contributing obesity in cat. Data was analysed using descriptive statistics to identify the level of awareness of cat owner and rate of overweight and obesity cat involved in study. Overall, majority of the cat owner were aware about the risk of feline obesity (77%) and rate for overweight and obese cat was 47.4% (n=71). Based on the literature review, gender, neutering status, age, breed, management, number of cat in household, type of diet, frequency of feeding, amount of feed given, owner awareness about risk of obesity and owner knowledge about calorie needed for their cat were identify as potential to be a risk factor for feline obesity. Therefore, Chi square test was done to determine the association between those variables and chances of cat become overweight and obese ($P < 0.05$). In this study overweight and obese cats were more likely had relationship with neutering status, age of cat, type of diet, management and frequency of feeding. Then binary logistic regression conducted to find the major risk factor for feline obesity. Based on the results, cats that are neutered, senior age (> 9 years old), commercial diet, kept indoor and feeding more than three times a day have a high risk in developing obesity. This study highlighted the importance of owner attitude towards prevention of obesity as the cat owner knowledge about prevention of feline obesity is

still low. Therefore owner education about feeding management and estimation of BCS is important to prevent the incidence of feline obesity.

Keywords: Feline, Obesity, Body condition score (BCS), Descriptive statistic, owner awareness, risk factor

1.0 INTRODUCTION

According to Crane (2002), obesity has been defined as condition of positive energy balance and excessive adipose tissue formation with adverse effects on morbidity and mortality. Companion animals are considered overweight is when the body weight is between 10% and 19% above ideal while obese when their body weight is 20% greater than ideal (Burkholder et al., 2000). There was no study had been reported was done on prevalence of feline obesity in Malaysia. However in United States the latest study based on 2014 National Pet Obesity Survey Result revealed the prevalence of overweight and obesity cats was 57.9%. This showed most of the owner did not aware or did not fully understand the danger of the obesity to their pet's life.

When talked about managing pet's health, owner's knowledge and awareness play a significant role. This is because owner's approach on management of their pet will determine the health status of the cat. The most common problem reported related with owner was, underestimation of BCS of owner (Colliard et al., 2009). In addition, many owners don't know how much energy needed in diet for their cat. (Schokkenbroek, 2006)

The main reason for the development of obesity is having a positive mismatch between energy intake and energy expenditure. Therefore, either excessive dietary intake or inadequate energy utilization can lead to a state of positive energy balance; numerous factors may be involved, including genetics, the amount of physical activity, and the energy content of the diet (Burkholder et al., 2000). Previous studies has identified the

risk factor for the feline obesity which include being male, neutered, middle age (Colliard et al., 2009; Courcier et al., 2010), mixed breed, living in single-or two cat households, confinement indoors (Robertson, 1999). In addition, owner underestimation of their cat's body condition also can be one of the main risk factor for feline obesity (Colliard et al., 2009). Dietary factors can also lead to the development of obesity in cat where frequent feeding was identified as a risk factor (Courcier et al., 2010).

Obesity is a growing problem and main concern in cat's health. Moreover, owner awareness and attitude play a major role in determine the health status of their cat. Since there is no previous study was done on feline obesity in Malaysia hence, the objectives of this study are:

- i. To determine the awareness of pet owner about the risk of obesity in cat.
- ii. To determine factors that contributing obesity in cat.

For this study, the following hypotheses were proposed:

- i. The percentage of pet owner who are aware is lower than the percentage of pet owner who are not aware.
- ii. There are factors that contributing obesity in cat.

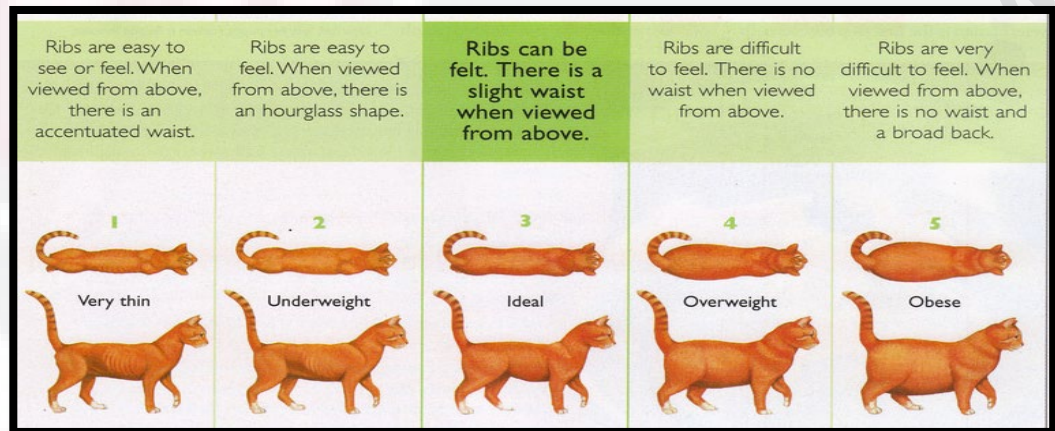
2.0 LITERATURE REVIEW

2.1 Measurement of obesity in companion animals

Currently, there is no a properly method for measuring obesity that is simple yet precise, accurate and accepted among owners and veterinarians (Boller et al., 2010). The most common methods usually practiced in a clinical setting are body weight and morphometric methods (e.g., BCS and body mass index [BMI]), while research methods include absorptiometry, ultrasound and use of isotopes (German, 2006).

- i) **Body condition scoring** : This is a subjective, semiquantitative method of evaluating body composition. A number of of scheme were introduced, with a 9-point or 5-point scheme being the most widely accepted (Laflamme, 1997). All systems assess visual and palpable characteristics that correlate subcutaneous fat, abdominal fat, and superficial musculature (e.g., ribcage , dorsal spinous processes, and waist) (German, 2006).

Figure 1: Body condition score chart to determine the body condition of the cat (picture courtesy of Hill's pet Nutrition Inc.)



- ii) **Body mass index (BMI):** BMI is a more objective method of determining body fat mass because it uses morphometric measurements (Boler et al., 2010). The equation used is by calculate the percentage of body fat:

Figure 2: Equation of feline body mass index. (Picture courtesy of BMI from Waltham)

The equation used rib cage circumference and the lower hindlimb measurement (in cm)

$$\text{Percentage body fat} = \frac{\left(\frac{\text{rib cage}}{0.7062} \right) - \text{LIM}}{0.9156} - \text{LIM}$$

Based on the equation “ribcage” is the circumference in the centimeters at the point of the ninth cranial rib and ‘LIM’ is the leg index measurement (the distance between the patella and the calcaneal tuber of the left posterior limb measured in centimeters (Butterwick , 2000).

Figure 3a: The length of the lower leg (LIM) from the middle of the patella.



Figure 3b: Measurement of rib cage circumference.



2.2 Disease associated with obesity

Obesity and overweight can have detrimental effects on the health and longevity of cats. Obese and overweight cats predisposed to various health issues include diabetes mellitus, dermatological problems, orthopedic disease, oral disease, hepatic lipidosis, urinary tract disease and cardiovascular disease (Scarlett & Donoghue, 1998, Lund et al., 2005, Laflamme, 2012).

2.3 Treatment and prevention of obesity

2.3.1 Dietary management :

Obesity is a consequences of energy intake exceeding requirement/ expenditure. Therefore owner should know how much calorie needed for their cat by calculate resting energy requirement (RER). The formula for RER based on Brook et al. (2014) is as below:

$$\text{RER in kcal/day} = 70 \times [\text{ideal BW(kg)}]^{0.75}$$

2.3.2 Lifestyle management:

Increasing physical activity is a useful adjunct to dietary therapy; when used in combination with dietary therapy, it promotes fat loss (Van & Sarris, 1989) and may assist in lean tissue preservation (Phinney, 1992). Exercise in cats can be encouraged by increasing play activity, using cat toys and feeding toys. Cats can also be encouraged to “work” for their food by moving the food bowl between rooms before feeding, or by the use of feeding toys (German, 2006).

2.3.3 Monitoring of weight loss:

Correct monitoring of body weight and body condition score is important to ensure the cat is in a healthy condition. Weight loss is more successful if owner keeps following up with regular weigh-in sessions (Yaissle et al, 2004). It is essential to continue to monitor body weight after the ideal weight has been achieved to ensure that weight that was lost is not regained (Laflamme & Kuhlman, 1995).

3.0 MATERIALS AND METHOD

A cross-sectional study was conducted among pet owner who consulted veterinary clinic in area Klang Valley. More than 20 small animal veterinary were involved in our study. The survey was conducted over a period of three weeks (11th January to 31st January 2016).

3.1 Preparation of Questionnaires

Structured questionnaire (Appendix A) with bi-language (English and Malay) was designed for this study. Each questionnaire consists of 34 questions and was divided into three sections. The questions only required owners respond to the question using simple responses (e.g. 'yes' or 'no') or by choosing the most appropriate answer from multiple choice answer given. Section A questions were formulated to focused towards cat profile while section B were more on feed and feeding regime. In section C, formulated question were more towards assessing owner knowledge and awareness about feline obesity and owners were asked to determine the body condition score (BCS) their cat using a validated, 5-point body condition scoring chart without any guidelines for assessing body condition (Appendix A). This question was the 'gold standard' in order to determine the rate of overweight and obese cat involved in this study.

3.2 Method of conducting survey

a. Face-to-face Interviews

Cat owners who visited the participating veterinary clinics were approached and asked if they were willing to participate in the survey.

b. Self-Administration Questionnaires

A few set of questionnaires were left at few clinics for one week. This is because some of the veterinarian preferred this approach for their clinics.

3.3 Data Analysis

The questionnaires were entered in Excel (Microsoft) and analysed using the IBM SPSS Version 22. The body condition scoring performed by the cat owner was converted to a dichotomous variable which later used as dependent variable (not overweight/obese or overweight/obese). The analysis was conducted in three steps. First, a descriptive analysis was conducted to obtain and understanding of the data and the population studied. From the descriptive statistic also we can determine the rate of overweight and obese cat in this study and also can determine the awareness of the cat owner about feline obesity. For the second step, Chi Square test was done to determine the relationship between each potential risk factor variable and risk of being obese. Decision was made based on the P value. If the $P < 0.05$, it showed there is statistically association between those variable and risk of being obese. Third, those variables that was significant at $P < 0.05$ were testing using binary logistic regression and the risk factor for feline obesity were determined based on odd ratio.

4.0 RESULT

A total of 150 questionnaires were collected and available for analysis.

4.1 Cat's profile

The overall cat population involved in the survey (n=150) mainly male at 57.3% while female comprised of 42.7% and further divided them to intact female (32%), 12.7% spayed female, 30% intact male and 25.3% castrated male. It showed most of the cat involved in this survey was intact. In this survey, age was classified into three categories: kitten (< 1 year old), adult (1- 8 years old) and senior (> 9 years old). Most of the cats involved in this survey were adult at 65.3%, followed by kitten 21.3% and senior adult 13.4%.

Out of 150 cats, 60% were local breed, 30% were pure breeds while the remaining 10% were cross breeds. Purebred cats mainly consist of these seven breeds; Persian (n=17), Siamese (n= 19), Maine Coon (n= 5), American short hair (n=2), British short hair (n=1) and Ragdoll (n=1). For type of management 46.7% of the cats were managed as semi-roamer, 44.7% were kept indoor and 8.7% of cats had access outdoor. About 46.7% of the respondents have 2-5 cats in the household while 30.7 % of the respondents only have one cats and remaining 22.7% kept more than five cats in the house. Majority of the respondents said their cats were active (88.7%), while 11.3% (n= 17) said not.

4.2. Feed and Feeding Regime

Majority of owners fed their cats with a commercially prepared dry and/or wet food (69.3%, n=104). Half of these cats (63.5%, n= 66) were fed only dry food, 10.6 % (n= 11) of the cats fed only wet food and 26% (n=27) were fed both dry and wet food (Table 7). From 150 cats, only 46 (30.7 %) were fed with homemade food which was commonly fish (67.4%, n= 31). Only 8 cats were fed with chicken (17.4%) and remaining 7 cats were fed with both fish and chicken (15.2%). Majority of the owner (47.8%, n=22) prepared their homemade food by boiling followed by frying (37%, n=17) and steaming (15.2%, n=7).

Most of the cats (40%, n=60) were fed twice a day. About 30% (n=45) of cats were fed three times a day, 19.3% (n=29) cats were fed more than three times a day and only 16 cats (10.7%) were fed once a day. Regarding amount food given, majority of the owner 76% (n=114) just fill the bowl when feeding their cat and remaining 24% (n=36) fed their cat by following the label instructions. Approximately half of the cats (54.7%, n=82) finished their food every time feeding. Of 150 cats, only 40 cats (26.7%) were given supplement. Owner were asked do they regularly adjust the amount of feed given based on age or body weight majority of the owner said no (66%, n=99).

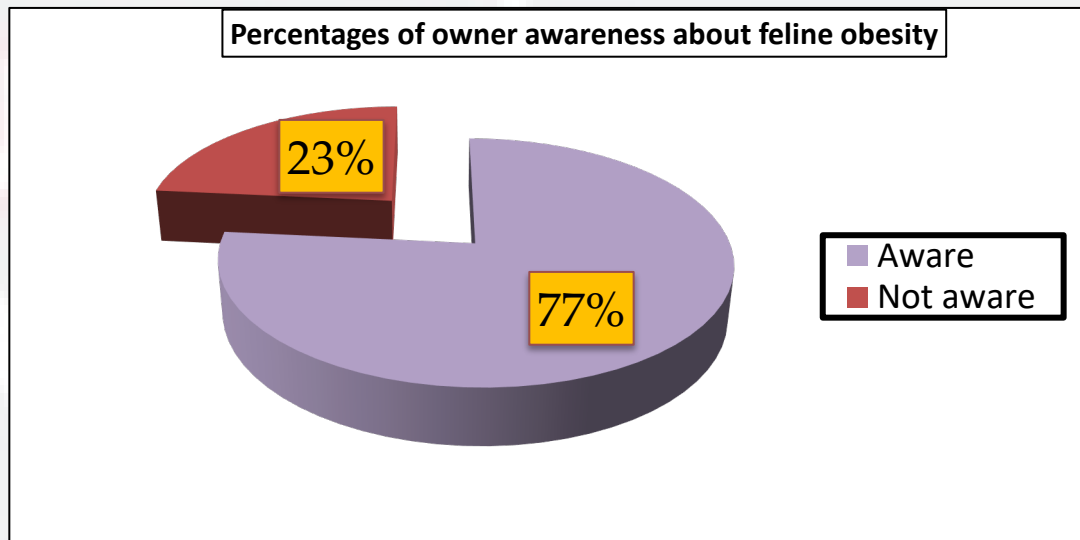
4.3. Awareness of pet owner about feline obesity.

To determine the awareness of pet owner about feline obesity, awareness assessment was made based on seven questions from the questionnaire. The questions are related with knowledge and awareness about feline obesity. It consists of yes and no answer. Respondent will get score only if they said yes. The respondents were categorized as aware about obesity if they score 3-7 and not aware if they score 2-0. Those questions were:

- 1) Have you heard about obese cat?
- 2) Do you know cat can be obese?
- 3) Do you think obesity is harmful for the animal's health?
- 4) Do you know what type of disease can occur to cat due to obese?
- 5) Do you know how to determine your cat obese or not?
- 6) Do you worried if your cat looks plump or obese
- 7) I'm not preferred my cat be obese cat rather than normal body weight cat?

Based on score it showed that 77% of cat owner are aware about feline obesity while the remaining 23% do not aware. Referring back to the hypothesis of this study, since the percentage of pet owner who are aware is higher than the percentage of pet owner who are not aware so we reject the null hypothesis and conclude majority of the pet owner in Klang Valley are aware about feline obesity.

Figure 4: Percentages of pet owner who are aware about feline obesity



4.4. Owner attitude on prevention of feline obesity.

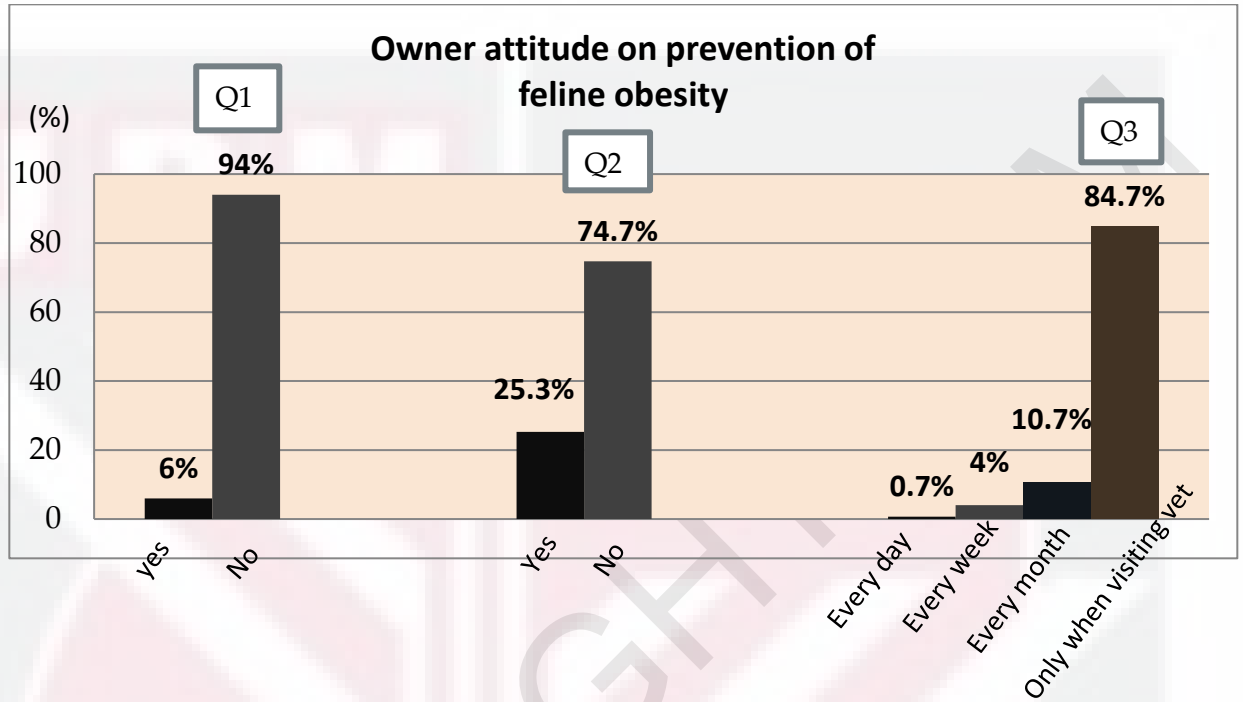
Some questions related to identify the attitude of owner on prevention of feline obesity.

Those questions were:

- 1) Do you know how to calculate calorie needed for your cat?
- 2) Do you regularly monitor the body weight of your cat?
- 3) How often do you weigh your cat?

The results showed 94% of cat owners do not know how to calculate calorie need for their cat. About 74.7% of cat owner do not regularly monitor the body weight of their cat and majority of the owner which is 84.7% weigh their cat only when visiting vet. Therefore we can safely assumed that owner attitude on prevention of feline obesity is still low.

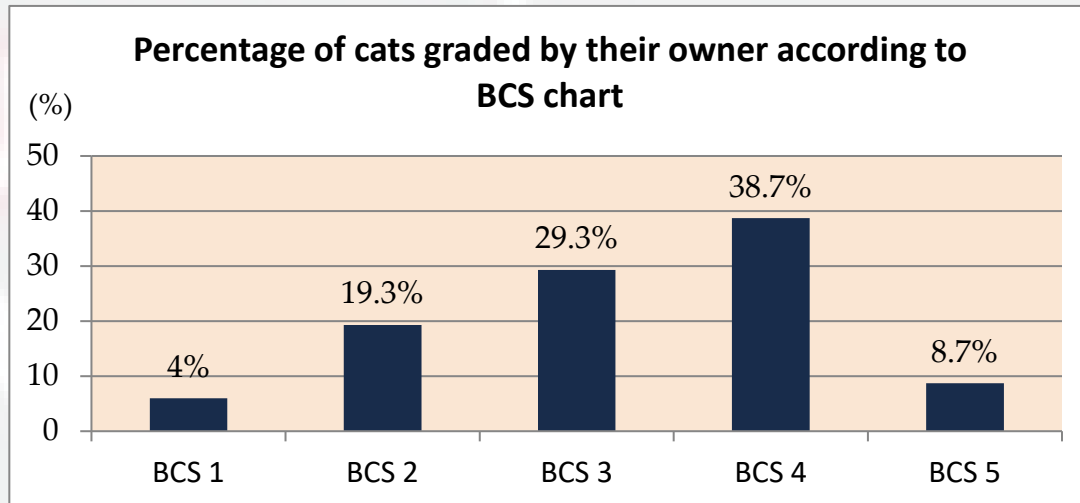
Figure 5: Graph of owner attitude towards prevention of feline obesity



4.5. Overweight and obese rating based of body condition score chart

Owner were given body condition score chart and were asked to score their cat based on the chart. Assessment of BCS by the owner showed 38.7 % (n=58) of cats were rated as overweight (BCS 4) and 8.7% (n=13) of cats rated as obese (BCS 5). Out of 150, 44 cats (29.3%) were rated as ideal (BCS 3). Remaining were rated as underweight which having BCS 2 (19.3%, n=29) and BCS 1 (6%, n=4). In overall the rate for overweight and obese cat in this survey was 47.4% (n=71).

Figure 6: Percentage of cat graded by their owner according to the BCS chart



4.6. Obesity risk factor analysis

Among risk factors considered, five variables were significantly associated with being overweight or obese: neutered status, age, management, type of feed and frequency of feeding. Table 30 shows the result of the univariable analysis. Based on the finding, we can reject the null hypothesis and conclude there were factors that can contribute obesity in cat. Then those five variables were entered into binary logistic regression to find the major risk within each variable by looking the odd ratio. An odds ratio (OR) is a measure of association between an exposure and an outcome. The OR tells us the odds that an outcome will occur given a particular exposure, compared to the odds of the outcome occurring in the absence of that exposure (Szumilas, 2010).

To interpret the odd ratio we need compare with the lowest odd ratio also known as baseline group. Therefore based on the odd ratio, for the neutered status, it showed the risk of being obese in neutered cat is 3.636 times higher than cats that are intact. For age, senior age cats (> 9years old) are at 9 times higher than kitten (< 1 years old) at risk to be obese. When comparing indoor with outdoor, cat that kept indoor is 4.938 times higher to get obese compared to cat that managed outdoor. For type of feed, it showed cat that fed with commercial diet had 4.339 times higher at risk to be obese compared to cat that fed with homemade diet. Lastly cats that are fed more than three times a day has 7.875 higher risks to be obese compared to cat that fed once a day. In conclusion, the risk factor for feline obesity in this study are neutered, senior age (> 9 years old), cat managed indoor, fed with commercial diet and fed more than three times a day.

Table 1: Obesity risk factor result

Variable	Level	BCS 1-3	BCS 4-5	P value	Odd ratio
Sex	Male	40	46	0.080	
	Female	39	25		
Neutered status	Intact	60	33	0.000	1.000
	Neutered	19	38		
Age	Kitten (< 1 year old)	24	8	0.000	1.000
	Adult (1-8 years old)	50	34		
	Geriatric (> 9 years old)	5	29		
Breed	Cross breed	7	8	0.080	
	Local breed	54	36		
	Pure breed	18	27		
Management	Indoor	27	40	0.013	4.938
	Semi roamer	42	28		
	Outdoor	10	3		
Number of cat in household	1	23	23	0.902	
	2-5	38	32		
	>5	18	16		
Type of diet	Commercial diet	44	16	0.000	4.339
	Homemade diet	35	60		
Frequency of feeding	Once a day	12	4	0.009	1.000
	Twice a day	27	18		
	Three times a day	32	28		
	More than three times a day	8	21		

5.0 DISCUSSION

In this study, 47.3% of cats were considered, by their owner as overweight and obese. This cannot be really represent the whole population of cats in Klang Valley as the sample size was small (n=150). In our study, cat owners were given body condition score chart and owner will graded their cat as underweight, ideal weight and overweight based on the chart. The data about obesity in our study is 100% from the owner judgment as we not examine the cat. Therefore the level of misclassification bias or underestimation by owner cannot be assessed. Colliard et al. (2009) in her study highlighted underestimation of the body condition by the owner as one of the risk factor for feline obesity. This is because some owner may be unwilling to admit that their pet is overweight or they did not know at what condition the cat is considered overweight. In our study there was a question asked about do the cat owner considered their cat as obese. Based on the result, 38 out of 71 (54%) of cat owners who graded their cat under BCS 4 and BCS 5 said no. This showed some owner still did not know at what condition the cat was considered as obese. In addition, almost 50% of the cat owners do not know to determine whether their cat was obese or not. Therefore, more effort from veterinarians is needed to educate cat owner on how to estimate the body condition score of their cat.

From our study, based on owner awareness assessment it showed most of the cat owner were aware about risk of feline obesity. Most of the owners did know what type of disease that can happen due to obesity. Besides, majority of the cat owner have heard about feline obesity and know cat can be obese. In addition, when asked either they

worried if their cats looks plump or obese about 64% of cat owner said yes and 75.3 % of cat owner said they do not prefer their cat be obese rather than normal body weigh cat. Therefore based on our study, most of the cat owners in Klang Valley are aware about feline obesity. However, when we looked into owner attitude on preventing obesity most of the owner did not committed toward it. Majority of the owner (94%) did not know how to calculate calorie needed for their cat and about 76% of owners just fill the bowl when fed their cat. From this, we cannot determine or conclude either their overfed their cat as we do not know the size of the bowl. However we can safely assume there a chance of overfeeding as owner did not know how to calculate calorie needed for their cat. In addition, 66% of owners do not regularly adjust the amount of feed given based on age or body weight. Moreover, majority of the owner do not regularly monitor the body weight of their cat and most of them weigh only when visiting clinic. From this finding, we can conclude even though most of the cat owners were aware about feline obesity, since there is no attempt or action taken on prevention of feline obesity, so most of their cats tend to be obese. From our finding also, it is not that owner prefer their cat be obese but it is more on they do not know on how to determine their cat is obese or not. Therefore, the owners tend to overfeeding their cat.

In my study neutering was found as one of the risk factor for feline obesity. Most studies had same finding with us (Courcier et al., 2010; Robertson 1999). This may be due to the hormonal changes which cause changes in levels of leptin, progesterins, and other hormones that result in increased appetite, and reduced energy metabolism and metabolic rate. Therefore owner should be control feed intake immediately after neutering and

monitor any changes in body weight and BCS to allow adjustment of feed intake if needed.

Scarlett et al. (1994) and Robertson (1999) observed middle aged cats (6-14 years old) had highest prevalence of overweight cats in their study. However, that result was contradicting in our study where we found senior age cat (> 9 years old) had higher risk to be obese rather than in adult age (1-8 years old). This may be due to as the cat increase in age, its metabolic rate slow down and cat will be less active and this can lead to obesity in cats.

Based on Scarlett et al. (1998), cats which manage indoor might be associated with the increase in the prevalence of obesity. Similarly with our study, we found cats which were managed indoor were likely to be overweight. This might be due reduced opportunity for exercise and increased attention to food because of loneliness or boredom. However, in my study there was no measure of a cat's activity level recorded even most of the owner claimed they played with their cat at home.

Study performed by (Courcier et al., 2010; had same findings with our study where they also identify frequency of feeding is one of the risk factor for obesity. In our study we observed those cats that eat more than three times a day had high risk to be obese. This is may be related with the owner attitude where most of the cat owner do not know how to calculate the calories needed for their cat and only full the bowl when fed them. Therefore there is chance for overfeeding. For the type of feed our study observed, cats that were fed with commercial diet had high risk to be obese compared to cats that fed

with homemade diet. In our study, cats that eat dry food had higher prevalence for obesity. Some studies have shown similar study which cat eat dry food are more likely to be overweight probably as a result of the high energy density of this food (Scarlett et al., 1994; Donoghue & Scarlett, 1998).

6.0 CONCLUSION

In conclusion, majority of cat owner in Klang Valley are aware about the risk of feline obesity and this study found that the major risk for overweight and obese in cats in Klang Valley were cat's age, neutering status, management, type of feed and frequency of feeding. However, owner attitude towards prevention of obesity is still low. Therefore owner education about feeding management and estimation of BCS is important to prevent the incidence of feline obesity.

7.0 RECOMMENDATIONS

- 1) Larger sample size for future study, therefore the prevalence of obese cat in Malaysia can be determined.
- 2) A study on the prevalence of disease occurs due to obesity is very relevant; as it can be one of the evidence to convince the owner there is important to prevent feline obesity.
- 3) Active involvement of veterinarian in assessing the BCS regularly for their patient as to encounter level of underestimation by the owner and to educate owner on the correct way to assess BCS for their cat.

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FEED AND FEEDING REGIME (MAKANAN AND CARA PEMAKANAN)

- 7) Is your cat fed with commercial diet? (*adakah kucing anda diberi makan komersial diet?*)
 Yes (*ya*) No (*tidak*)
- 8) If yes, what type of diet? (*jika ya, apakah jenis diet tersebut?*)
 Dry (*kering*) wet (*basah*)
- 9) Is your cat fed with homemade food?(*adakah kucing anda diberi makan buatan sendiri?*)
 Yes (*Ya*) No (*Tidak*)
- 10) If yes, what type of homemade food given? (*jika ya, apakah jenis makanan tersebut?*)

- 11) How do you prepare homemade food for your cat? (*bagaimanakah cara anda menyediakan makanan buatan sendiri untuk kucing anda?*)
 Fry (*goreng*) steam (*kukus*) others (*lain-lain*): _____
- 12) How often is the food given? (*Berapa kerap anda memberi kucing makan?*)
 once a day (*sekali sehari*) Three times a day (*3 kali sehari*)
 Twice a day (*2 kali sehari*) More than 3 times a day (*lebih dari 3 kali sehari*)
- 13) How much of food given for every meal? (*Berapa banyak makanan diberi setiap kali makan?*)
 Just fill the bowl (*hanya penuhkan mangkuk*)
 follow the label instructions (*ikut arahan pada label makanan*)
- 14) Did your cat finish the food given every time you feed them? (*Adakah kucing anda menghabiskan semua makanan setiap kali makan?*)
 Yes (*Ya*) No (*Tidak*)

15) Did you give supplement to your cat? (*Adakah kucing anda diber imakanan tambahan?*)

Yes (*ya*)

No (*tidak*)

16) If yes what is the type of supplement? (*jika ya apakah jenis makanan tambahan tersebut?*)

17) Do you regularly adjust the amount of feed given based on age or body weight?(*adakah anda selalu menukar jumlah makanan diberi mengikut umur atau berat?*)

Yes (*Ya*)

No (*tidak*)

OWNER KNOWLEDGE AND AWARENESS ABOUT FELINE OBESITY

18) Education status (*tahap pendidikan*) : SPM

Degree

Diploma

None

19) Income per month (*gaji bulanan*) : < RM 1000

> RM 1000-RM 3000

> RM 3000

20) Have you heard about obese cat? (*Adakah anda pernah mendengar mengenai kucing obese?*)

Yes (*Ya*)

No (*Tidak*)

21) Do you know cat can be obese? (*Adakah anda tahu kucing boleh menjadi obese?*)

Yes (*ya*)

No (*Tidak*)

22) Do you think obesity is harmful for the animal's health? (*Adakah obesity membahayakan kesihatan haiwan?*)

Yes (*ya*)

No (*tidak*)

23) Do you know what type of disease can occur to cat due to obese? (*Adakah anda tahu penyakit apa yang akan berlaku kepada kucing disebabkan obese?*)

Yes (*ya*)

No (*tidak*)

24) Do you know how to determine your cat obese or not? (*Adakah anda mengetahui cara menentukan kucing itu obese atau tidak?*)

Yes (*ya*)

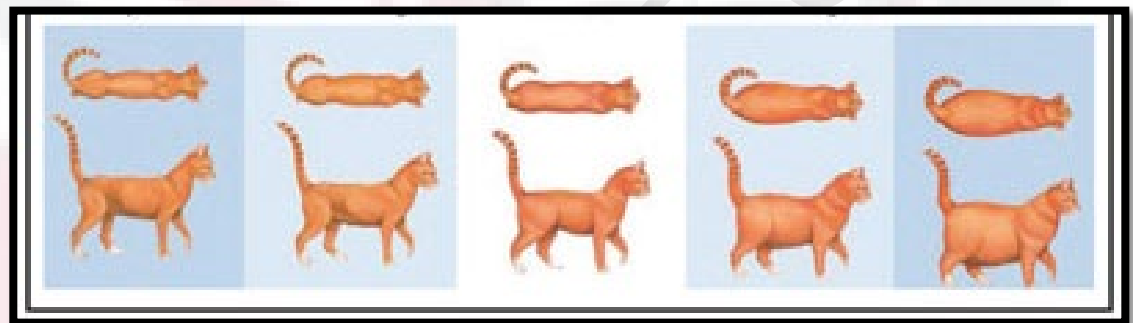
No (*tidak*)

25) Do you consider your animal as obese? (*adakah anda rasa kucing anda obese?*)

Yes (*ya*)

No (*tidak*)

26) In your opinion, what is the body condition score of your cat, based on the chart (*sila tandakan gambar yang menggambarkan kucing anda*)



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27) Do you know how to calculate calorie needed for your cat? (*adakah anda tahu cara mengira jumlah kalori yang diperlukan untuk kucing anda?*)

Yes (*ya*)

No (*tidak*)

28) Do you regularly monitor the body weight of your cat? (*adakah anda mengawasi berat badan kucing anda?*)

Yes (*ya*)

No (*tidak*)

29) How often do you weigh your cat? (*Berapa kerap anda menimbang berat kucing anda?*)

Every day (*setiap hari*)

Every week (*setiap minggu*)

Every month (*setiap bulan*)

Only when visiting vet (*hanya apabila berjumpa vet*)

30) In your opinion, does the obese cat look cuter than normal weight cat? (*kucing obese lebih menarik berbanding kucing dengan berat badan normal*)

Yes (*ya*)

No (*tidak*)

31) Do you worried if your cat looks plump or obese? (*adakah anda risau jika kucing anda obese?*)

Yes (*ya*)

No (*tidak*)

32) I prefer my cat be obese cat rather than normal body weight cat? (*saya lebih menyukai kucing saya obese berbanding kucing dengan berat badan normal*)

Yes (*ya*)

No (*tidak*)

33) Do you play with your cat at home?(*Adakah anda selalu bermain dengan kucing anda di rumah?*)

Yes (*ya*)

No (*tidak*)