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Journal Articles

KNOWLEDGE, ATTITUDE AND PRACTICE (KAP) OF CAT OWNERS TOWARDS CHRONIC KIDNEY DISEASE (CKD)

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Managing cats diagnosed with chronic kidney disease (CKD) often requires long-term treatment to improve their quality of life. This study aimed to (i) assess the knowledge, attitude and practice (KAP) of cat owners towards CKD; (ii) determine if socio-demographic characteristics and cat ownership influence KAP; and (iii) examine the association between KAP. A cross-sectional online survey was conducted, and 300 cat owners participated in this study. Data collected were descriptively analysed, and associations were determined using the Mann-Whitney U test, Kruskal-Wallis H test and Spearman's correlation analysis. Majority of the respondents were from Selangor (43.1%), female (80.7%), between 20-29 years old (49.0%) and had a monthly household income of RM2000-RM5000 (29.0%). Most of them had an education level of first degree or diploma (66.3%) with an occupation or study related to life sciences (30.1%). The majority of cat owners (86.3%) were aware that cats could be diagnosed with CKD, and their primary sources of information were from the internet (65.1%), followed by veterinarians (38.7%) and printed reading materials (38.0%). The cat owners in this study had good knowledge, attitude and practice towards CKD with median (IQR) scores of 12.5 (7.0), 5.0 (0.0) and 5.0 (4.0), respectively. Factors like occupation or study field, duration of rearing cats and experience handling pets with kidney-related issues significantly influenced their knowledge of CKD ($p<0.05$). Education level and occupation or study field showed significant association ($p<0.05$) in owners' attitudes. Gender and education level with a history of having cats with chronic illnesses and having supported cats with kidney-related problems significantly affected ($p<0.05$) their practice. Significant correlations ($p<0.01$) between knowledge-attitude ($r=0.217$), knowledge-practice ($r=0.301$) and attitude-practice ($r=0.249$) were observed. Hence, good knowledge among cat owners would positively influence attitude and practice. In conclusion, implementing planned strategies and educational interventions may improve cat owners' awareness and knowledge. Thus, their attitude and practice towards the intention to treat cats with CKD can also be improved.

Keywords: chronic kidney disease; cat owners; knowledge; attitude; practice

INTRODUCTION

Chronic kidney disease (CKD), often called chronic renal failure, is a progressive loss of functional renal mass with clinical or routine laboratory evidence of renal dysfunction. In cats, CKD is among the most common medical conditions, especially in geriatric pet cats (typically starting at around 15 years of age and above) , with a reported prevalence of 1-3% in the general feline population and up to 35% in the geriatric feline population (Greene et al., 2014). The overall prevalence of feline CKD increased from 0.04% in the 1980s to 0.2% in the 1990s and almost about 1% by the 2000s (Brown et al., 2016). CKD was diagnosed in all age groups, but its prevalence increased with age (with >30% of cats over 15 years of age) (Bartges, 2012).

In Malaysia, Lim et al. (2012) reported that the most common disease in geriatric cats presented to University Veterinary Hospital (UVH) was kidney disease (33.3%). The top three clinical signs observed by owners were lethargy, anorexia, and weight loss. The typical physical examination findings reported were dehydration and emaciation. From the laboratory findings, non-regenerative anaemia, lymphopaenia, azotaemia, hypercholesterolaemia, metabolic acidosis, hyperphosphataemia and isosthenuria were often observed in cats with CKD (DiBartola et al., 1987; Paepe and Daminet, 2013). The prevalence of CKD-associated complications rose with the advanced stage, also known as Stage 4 CKD, that represents the most severe progression of the disease (Paepe and Daminet, 2013; Brown et al., 2016).Treatment and prognosis may vary with different stages of the kidney based on the International Renal Interest Society (IRIS), which classified CKD into four stages (Brown et al., 2016).

Management of CKD is primarily focused on supportive and symptomatic therapy to improve the quality of life and slow the disease progression. Due to the chronic nature of the disease, it is vital to establish a good relationship and communication between veterinarians and cat owners (Sparkes et al., 2016). To our knowledge, there are limited local studies that determine the level of knowledge, attitude and practice (KAP) of cat owners about CKD in cats. Amiruddin et al. (2020) found that most pet owners with a good level of knowledge had better attitudes and practices towards animal health. Therefore, it is believed that improving the knowledge and attitude of cat owners on CKD may allow owners to take prompt actions such as regular health check-ups, early detection or screening, prevention, treatment, and initiating proper management of CKD if their cats were diagnosed. The study aimed to assess the KAP and the association between

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socio-demographic and cat ownership characteristics that influence the KAP of cat owners towards cats diagnosed with CKD. The association between knowledge, attitude and practice of cat owners towards CKD were examined.

MATERIALS AND METHODS

Study design

The conduct of this study obtained approval (JKEUPM-2021-234) from the Ethics Committee for Research Involving Human Subjects, Universiti Putra Malaysia (UPM) and the research committee of the Faculty of Veterinary Medicine, UPM.

A quantitative cross-sectional survey was used to determine the knowledge, attitude and practice of cat owners towards CKD in Malaysia. The inclusion criteria of targeted respondents were: (i) owners or carers of pet cats, (ii) Malaysians who were ≥18 years of age, and (iii) able to understand either English or Bahasa Malaysia language in order to complete the questionnaire.

Sampling method

The targeted respondent was conveniently recruited for 12 days (13th to 24th September 2021). The digital questionnaire was distributed to the public through social media platforms (e.g. WhatsApp, Facebook and Instagram) and invitation via email. The respondents' consent to participate were obtained, confidentiality was assured, and the data collected will only be used for this study. The respondents' participation was voluntary, and they were allowed to withdraw at any time without any repercussions or explanation.

In Selangor, an estimated 1.5 million household's own cats based on Euromonitor May 2024 report. To achieve results with a ±5% margin of error at a 90% confidence level, a sample size of approximately 271 respondents was recommended.

Research tools/instruments

A digital questionnaire using Google Forms was constructed in English and Bahasa Malaysia, which respondents could complete in approximately 15 minutes. A pilot study was conducted on 20 participants (consisting of cat owners of different age groups and levels of education) to ensure that the questionnaire was suitable for data collection in this study. Their feedback was essential to ensure the questions were easy to understand before the data collection. Comprehension of instructions, clarity of the wording used, the questions, the time taken for completion and issues raised during the pre-test were addressed based on the respondents' feedback. The calculated Cronbach alpha value of more than 0.7 was achieved, and all the items in the questionnaire were validated (Pallant, 2011) . Hence the survey was deemed reliable and valid.

The survey questionnaire was divided into four sections: i) demographic and socioeconomics data of the cat owners, ii) cat ownership information; iii) cat owners' awareness towards CKD; iv) cat owner's knowledge, attitude and practice towards CKD. The questions were designed using dichotomous and multichotomous closed-ended questions and a 7-point Likert scale. The first section collected information such as the demographic and socioeconomics of the cat owners (age, gender, number of households, monthly household income, level of education and employment status). The following section enquires about cat ownership, their experience with pet cats, supporting cats with chronic illness and kidney disease and the purpose of having pet cats as their choice. The third section comprised questions related to awareness of cat owners and their primary sources of information on CKD. The fourth section was subdivided into three smaller sections which were the knowledge (10 questions on general knowledge and 20 questions on identifying clinical signs of CKD), attitude (5 questions using a 7-point Likert scale from strongly disagree to strongly agree) and practice (8 questions) of cat owners towards CKD. Overall, the survey consisted of a total number of 56 questions.

Score calculation of knowledge, awareness and practice

There were 30 questions in the knowledge section. A total score of 10 was allocated, and the knowledge of respondents was assessed using questions related to CKD, namely risk factors, diagnosis, treatment and management. The ability of respondents to identify clinical signs of CKD was tested using thirteen kidney- and seven non-kidney-related clinical signs, and they were given a total score of 10. Hence, the total score for the knowledge section was 20. A cut-off point of score <11 was considered poor, whereas ≥11 was considered adequate knowledge about CKD.

For attitude assessment, a seven-point Likert-type scale, as follows: 1: disagree; 2: somewhat disagree; 3: strongly disagree; 4: unsure; 5: agree; 6: somewhat agree, and 7: strongly agree, was used in five questions constructed. Respondents were classified as having a negative attitude when scored <4 and a positive attitude when scored ≥4. A scale of 1-4 was labelled as a negative attitude with a given score of 0, while a scale of 5-7 was labelled as a positive attitude with a score of 1. The total score for the attitude section was 5.

The practice of cat owners was assessed using eight questions with a total score of 8. A score of 0 was given when the respondents answered 'never' or 'occasionally', while a score of 1 was given when they answered 'always'. A score of <4 was categorised as poor practice, whereas a score of ≥4 was categorised as good practice.

Statistical analysis

Descriptive analysis, reliability, and normality of measurement items were analysed using IBM® SPSS® Statistics Version 26. Data obtained was transferred into a spreadsheet, data was filtered, and coding was carried out. Categorical variables were presented as frequencies and percentages while continuous variables were presented as median and interquartile range. Data normality was performed using the Kolmogorov-Smirnov test, and given the non-normal distribution of the data, inference statistics (Mann-Whitney U and Kruskal-Wallis H tests) were used to determine the difference in median scores. Spearman's rank correlation analysis evaluated the relationship

between knowledge, attitude and practice towards CKD. The interpretation of correlation coefficients was as follows: 0-0.25 = weak correlation, 0.25-0.5 = fair correlation, 0.5-0.75 = good correlation and >0.75 = excellent correlation (Haq *et al*., 2012). A P-value <0.05 was considered statistically significant for Mann-Whitney U and Kruskal-Wallis H tests, whereas a P-value <0.01 was considered significant for correlation analysis.

RESULTS

A total of 309 responses (Table 1) were received, but only300 final usable data were included in this study after excludingrespondents who had failed to complete the questionnaire in the KAP section (n=4), repeated the questionnaire (n=3), or did not fulfil the inclusion criteria (n=2).

Table 1: Demographic and socio-economic characteristics of cat owners (respondents).

Characteristics		Frequency (n)	Percentage (%)	Total (n)
State	Selangor	128	43.1	297
	Kuala Lumpur	41	13.8	
	Johor	30	10.1	
	Perak	19	6.4	
	Penang	16	5.4	
	Negeri Sembilan	13	4.4	
	Melaka	12	4.0	
	Kedah	10	3.4	
	Pahang	8	2.7	
	Sarawak	5	1.7	
	Kelantan	4	1.3	
	Putrajaya	4	1.3	
	Perlis	4	1.3	
	Sabah	3	1.1	
	Terengganu	0	0.0	
	Labuan	0	0.0	
Gender	Male	58	19.3	300
	Female	242	80.7	
Age (years old)	≤ 19	8	2.7	300
	20 - 29	147	49.0	
	30 - 39	69	23.0	
	40 - 49	41	13.7	
	≥ 50	35	11.6	
Monthly Household Income (RM)	< 2000	63	21.2	297
	2000 - 5000	86	29.0	
	5001 - 10000	83	27.9	
	10001 - 20000	42	14.1	
	> 20000	23	7.8	
Level of Education	None	0	0.0	300
	Primary school	1	0.3	
	Secondary school	42	14.0	
	First degree or Diploma	199	66.3	
	Master degree or PhD	58	19.4	
Occupation / Study field	Not working or a student	74	25.6	289
	Self-employed	43	14.9	
	Life sciences	87	30.1	
	Social sciences	85	29.4	

The demographic and socio-economic characteristics of the respondents are summarised in Table 1. The majority of the respondents resided in Selangor (n=128, 43.1%), consisting of 58 (19.3%) males and 242 (80.7%) female cat owners. A majority of them were in the age groups between 20-29 years old (n=147; 49.0%), with monthly household income of RM2000-RM5000 (29.0%), with education level of first degree or diploma (66.3%) and had occupation related to life sciences (30.1%)

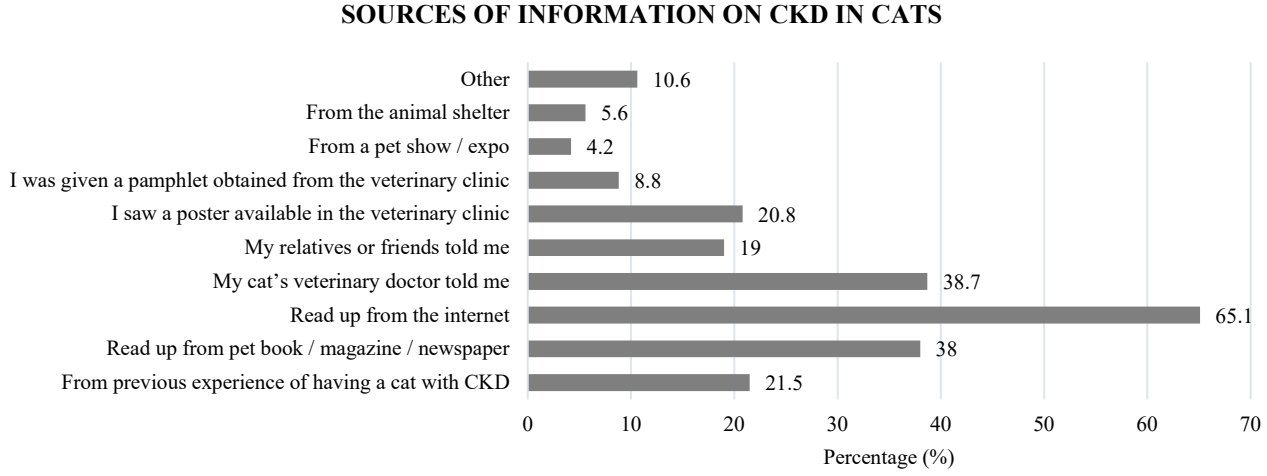
Among the 300 cat owners (refer to Table 2), a majority had 1-5 cats in a household (77.3%) and had between 1-5 years (41.6%) of experience in rearing cats. Many of the respondents (84.7%) had cats as their pets. Only 25.7% of the respondents had cats diagnosed with chronic illnesses, and about 31.7% had experience handling pets with kidney-related issue.

About 86.3% (n=259) of the respondents claimed that they were aware that cats could be diagnosed with CKD. The three primary sources of information regarding CKD (Figure 1) were gained from internet sources (65.1%), educated by veterinarians (38.7%) and reading about CKD from pet books, magazines or newspaper articles (38.0%).

Table 2: Cat ownership information

Variables		Frequency (n)	Percentage (%)	Total (n)
Number of cats	1 - 5	232	77.3	300
	6 - 10	40	13.3	
	11 - 15	16	5.3	
	> 15	12	4.0	
Years of experience caring for cats	< 1	10	3.4	298
	1 - 5	124	41.6	
	6 - 10	69	23.2	
	11 - 15	35	11.7	
	> 15	60	20.1	
Having cats with chronic illnesses	Yes	77	25.7	300
	No	223	74.3	
Having experience in supporting cat (s) with CKD	Yes	95	31.7	300
	No	205	68.3	
Purpose of Having a Cat in Household	As a pet for myself	254	84.7	300
	As a pet for my children	37	12.3	
	I am a breeder	8	2.7	
	I rescue cats	99	33.0	
	Others	3	1.0	

Figure 1: The different sources of information that respondents (n=300) obtained on the topic of cats diagnosed with CKD based on frequency (%)*



**respondents can choose more than one option for this question*

Table 3 illustrates the responses of cat owners on knowledge of CKD. Knowledge was assessed using questions about CKD risk factors, clinical signs, diagnosis, treatment and management. Of the 300 respondents, only 118 (39.3%) had poor knowledge about CKD in cats, whereas many had good knowledge (n= 182, 60.7%). Poor knowledge was apparent in responses to questions relating to symptoms (questions 9, 11-15, 24, 26-30). The top 3 questions with the least correct answers were questions 13, 15 and 24, in which only 13.7%, 19.7% and 19.3% of the respondents answered correctly to these questions, respectively. On the other hand, most respondents could correctly answer questions 1, 17 and 18, respectively, at 86.3%, 83.7% and 84.7%. The median (IQR) knowledge score for this study was 12.5 (7.0).

Attitude towards CKD was assessed using five questions, as presented in Table 4. Interestingly, over 90.0% of the cat owners had a positive attitude on each question. Consistently, a majority of respondents (95.7%) had a desirable attitude with a median (IQR) score of 5.0 (0) overall.

Table 3. Assessment (%) on the knowledge of respondents based on risks, diagnosis, treatment, management and clinical signs of cats with CKD

Questions on risks, diagnosis, treatment and management of CKD in cats	Correct (n, %)	Incorrect (n, %)
1. Cats can suffer from chronic kidney disease (CKD).	259 (86.3%)	41 (13.7%)
2. Both young and old cats are susceptible to CKD.	241 (71.3%)	86 (28.7%)
3. CKD is a progressive disease.	200 (66.7%)	100 (33.3%)
4. CKD is commonly diagnosed in older cats.	176 (58.7%)	124 (41.3%)
5. The damage to the kidneys in CKD is irreversible.	189 (63.0%)	111(37.0%)
6. The management of CKD is long-term.	246 (82.0%)	54 (18.0%)
7. The management of CKD is largely focused on supportive and symptomatic therapy.	204 (68.0%)	96 (32.0%)
8. The aim of managing CKD is to improve the patient's quality of life and slow the disease progression.	246 (82.0%)	54 (18.0%)
9. The clinical signs of CKD appear when 75% of the kidney structure is damaged.	141 (47.0%)	159 (53.0%)
10. The diagnosis of CKD requires more than one diagnostic test.	162 (54.0%)	138 (46.0%)
Questions – Respondent's ability to identify clinical signs of CKD in cats		
11. Difficulty in breathing	110 (36.7%)	190 (63.3%)
12. Nasal discharge	135 (45.0%)	65 (55.0%)
13. Cannot urinate	41 (13.7%)	259 (86.3%)
14. Coughing	140 (46.7%)	160 (53.3%)
15. Exercise intolerance	59 (19.7%)	241 (80.3%)
16. Looks depressed	236 (78.7%)	64 (21.3%)
17. No appetite	251 (83.7%)	49 (16.3%)
18. Looks lethargy (tired)	254 (84.7%)	46 (15.3%)
19. Drinks lots of water	176 (58.7%)	124 (41.3%)
20. Urinate a lot	164 (54.7%)	136 (45.3%)
21. Dehydrated	196 (65.3%)	104 (34.7%)
22. Weight loss / poor body score (thin)	240 (80.0%)	60 (20.0%)
23. Dull hair coat	185 (61.7%)	115 (38.3%)
24. Big swollen belly	58 (19.3%)	242 (80.7%)
25. Vomiting	152 (50.8%)	147 (49.2%)
26. Diarrhoea	106 (35.3%)	194 (64.7%)
27. Bad breath	135 (45.0%)	165 (55.0%)
28. Ulcerated mouth	112 (37.3%)	188 (62.7%)
29. Seizure	71 (23.7%)	229 (76.3%)
30. Paralysis	84 (28.0%)	216 (72.0%)

Table 4. Assessment (%) on the attitude of respondents towards cats with CKD

Questions	Positive (n, %)	Negative (n, %)
1. It is wise to bring my cats for his/her regular check-ups.	289 (96.3%)	11 (3.7%)
2. It is a good idea to ensure that my cat is healthy.	298 (99.3%)	2 (0.7%)
3. It is wise to continue the life-long therapy (medication) to benefit my cat's life.	282 (94.3%)	17 (5.7%)
4. I will update my veterinarian during each check-up on my cat's condition during treatment at home.	280 (93.3%)	20 (6.7%)
5. I will contact my veterinarian immediately when my cat looks sick.	289 (96.7%)	10 (3.3%)

Practices towards CKD were assessed by eight questions, as demonstrated in Table 5. About 70.3% of respondents had good practice, while 29.7% had poor practice. The majority of the respondents always brought their cats to the veterinarians if their cats were unwell (n=212, 70.9%), for follow-up treatments (n=198, 66.0%), gave medications to their cats according to prescription (n=243, 81.3%), followed the dietary restrictions for their cats (n=186, 62.0%), and will learn more about the disease from digital sources (n=178, 59.3%). Nearly half of the respondents (48.3%) occasionally brought their cats for regular check-ups, and about 61 (20.3%) cat owners have never monitored their cats' water intake and urine volume. Generally, the median (IQR) score for practices towards CKD was 5.0 (4.0), which revealed good practices among the cat owners.

Table 6 showed the association of demographic characteristics and cat ownership to median KAP scores. Among the demographic variables, females had significantly higher ($p<0.05$) median practice scores than males. Besides that, education level had a significant association ($p<0.05$) with median attitude and practice scores. The field of occupation or study was also significantly correlated ($p<0.05$) with median knowledge and attitude scores. Among the cat ownership variables, a significant difference ($p<0.05$) in terms of knowledge and years of experience in taking care of cats was noted in this study. Moreover, having cats with chronic illnesses among pet owners significantly improved ($p<0.05$) the median practice score, while having experience in handling pets with kidney-related problems significantly improved ($p<0.05$) the knowledge and practice scores.

There were significant ($p<0.01$) positive linear correlations between knowledge-attitude ($r=0.217$), knowledge-practice ($r=0.301$) and attitude-practice ($r=0.249$), respectively (Table 7).

Table 5: Assessment (%) on the practice of respondents towards cats with CKD

Questions	Never (n, %)	Occasionally (n, %)	Always (n, %)
1. I bring my cats to the veterinarian when unwell.	14 (4.7%)	73 (24.4%)	212 (70.9%)
2. I bring my cats to the veterinarian for regular check-ups.	46 (15.3%)	145 (48.3%)	109 (36.3%)
3. I bring my cats to the veterinarian for follow-up treatments.	25 (8.3%)	77 (25.7%)	198 (66.0%)
4. I give medications to my cats with the correct regimen and dosage (according to prescription).	18 (6.0%)	38 (12.7%)	243 (81.3%)
5. I follow the food restrictions for my cats, such as a low-salt diet.	32 (10.7%)	82 (27.3%)	186 (62.0%)
6. I monitor the water intake and urine volume of my cats.	61 (20.3%)	109 (36.3%)	130 (43.3%)
7. I monitor the feed intake and body weight of my cats.	47 (15.7%)	118 (39.5%)	134 (44.8%)
8. I search for disease information from websites / social media to improve my knowledge.	37 (12.3%)	85 (28.3%)	178 (59.3%)

Table 6: Comparison of median KAP scores with demographic characteristics and cat ownership of respondents recruited in this study

Variables	n	Median knowledge score (IQR)	P-value	Median attitude score (IQR)	P-value	Median practice score (IQR)	P-value
State*			0.420		0.507		0.886
Johor	30	13.00 (8.3)		5.00 (0.0)		5.00 (5.8)	
Kedah	10	14.25 (7.5)		5.00 (0.0)		4.00 (6.3)	
Kelantan	4	8.25 (15.0)		5.00 (1.5)		3.00 (7.5)	
Melaka	12	14.50 (5.0)		5.00 (0.0)		5.00 (3.0)	

Negeri Sembilan	13	9.00 (6.0)		5.00 (0.0)		5.00 (3.0)	
Pahang	8	12.25 (4.5)		5.00 (1.0)		3.50 (5.3)	
Penang	16	12.00 (5.0)		5.00 (0.0)		6.00 (4.0)	
Perak	19	11.00 (7.0)		5.00 (0.0)		4.00 (6.0)	
Perlis	4	14.75 (9.9)		5.00 (3.8)		4.50 (7.3)	
Sabah	3	17.00 (0.0)		5.00 (0.0)		5.50 (0.0)	
Sarawak	5	11.00 (8.0)		5.00 (0.0)		6.00 (4.0)	
Selangor	128	12.50 (6.5)		5.00 (0.0)		5.00 (4.0)	
Terengganu	0	-		-		-	
Kuala Lumpur	41	12.75 (6.4)		5.00 (0.0)		5.50 (3.0)	
Labuan	0	-		-		-	
Putrajaya	4	16.25 (0.0)		5.00 (0.0)		7.00 (0.0)	
Gender**			0.430		0.061		0.005
Male	58	11.50 (8.4)		5.00 (0.0)		4.00 (5.0)	
Female	242	12.50 (7.0)		5.00 (0.0)		5.00 (4.0)	
Age (years)*			0.654		0.102		0.168
≤ 19	8	9.00 (7.8)		5.00 (2.8)		4.50 (3.5)	
20 - 29	147	12.50 (7.0)		5.00 (0.0)		5.00 (3.5)	
30 - 39	69	13.00 (7.3)		5.00 (0.0)		5.00 (8.0)	
40 - 49	41	11.25 (6.0)		5.00 (0.0)		6.00 (3.0)	
≥ 50	35	12.50 (6.3)		5.00 (0.0)		5.00 (4.5)	
Monthly household income (RM)*			0.481		0.394		0.280
< 2000	63	11.00 (8.0)		5.00 (0.0)		5.00 (5.0)	
2000 - 5000	86	13.00 (6.5)		5.00 (0.0)		5.00 (4.0)	
5001 - 10000	83	12.00 (7.0)		5.00 (0.0)		5.00 (4.0)	
10001 - 20000	42	13.25 (7.1)		5.00 (0.0)		5.00 (4.0)	
> 20000	23	11.50 (5.0)		5.00 (0.0)		6.00(3.5)	
Education level*			0.350		0.028		0.017
Primary school	1	13.50		5.00		5.00	
Secondary school	42	12.50 (7.5)		5.00 (1.0)		3.00 (4.0)	
First degree or Diploma	199	12.00 (7.0)		5.00 (0.0)		5.00 (4.0)	
Master degree or PhD	58	13.00 (4.4)		5.00 (0.0)		5.00 (4.0)	
Occupation*			0.000		0.031		0.281
Not working or student	74	12.75 (7.9)		5.00 (0.0)		4.50 (4.0)	
Self-employed	43	11.75 (5.8)		5.00 (0.0)		5.00 (4.0)	
Life sciences	87	14.00 (5.0)		5.00 (0.0)		5.00 (4.0)	
Social sciences	85	10.00 (6.1)		5.00 (0.0)		5.00 (3.3)	
Number of cats*			0.621		0.115		0.332
1 - 5	232	12.50 (7.0)		5.00 (0.0)		5.00 (4.0)	
6 - 10	40	12.50 (7.8)		5.00 (0.0)		4.50 (5.3)	
11 - 15	16	12.25 (4.8)		5.00 (0.0)		5.00 (2.8)	
> 15	12	13.50 (6.4)		5.00 (0.0)		5.00 (6.8)	
Years of experience of caring cats*			0.039		0.351		0.536
< 1	10	8.50 (4.0)		5.00 (1.0)		7.00 (4.0)	
1 - 5	124	12.00 (7.8)		5.00 (0.0)		5.00 (4.0)	
6 - 10	69	13.50 (7.8)		5.00 (0.0)		4.00 (3.0)	

11 - 15	35	12.00 (5.5)		5.00 (0.0)		5.00 (2.8)	
> 15	60	13.75 (4.4)		5.00 (0.0)		5.00 (4.0)	
Having cats with chronic illnesses**			0.214		0.303		0.003
Yes	77	13.00 (6.0)		5.00 (0.0)		5.00 (3.0)	
No	223	12.00 (7.5)		5.00 (0.0)		5.00 (5.0)	
Having Experience in Handling Pet(s) with Kidney-related Issues**			0.000		0.089		0.000
Yes	95	15.00 (4.5)		5.00 (0.0)		6.00 (3.0)	
No	205	10.50 (6.1)		5.00 (0.0)		4.00 (4.3)	

** Kruskal-Wallis test, level of significance was p<0.05; IQR, interquartile range*
*** Mann-Whitney U test, level of significance was p<0.05; IQR, interquartile range*

Table 7. Correlation between knowledge, attitude and practice scores of respondents towards cats with CKD

Spearman's rho		Knowledge score	Attitude score	Practice score
Knowledge score	Correlation coefficient	1.000	0.217*	0.301*
	P-value		0.000	0.000
Attitude score	Correlation coefficient	0.217*	1.000	0.249*
	P-value	0.000		0.000
Practice score	Correlation coefficient	0.301*	0.249*	1.000
	P-value	0.000	0.000	

** Correlation is significant at the 0.01 level (2-tailed)*

DISCUSSION

This study investigated the KAP of cat owners in Malaysia towards CKD, determined the socio-demographic characteristics and cat ownership characteristics that influence the KAP of cat owners, and examined the associations between KAP. In this study, most of the respondents recruited were from Selangor, and the remaining were from all other states except Terengganu and Labuan. Most respondents recruited in this study were from the age group of 20-29 years old. It was suspected that these individuals in this age group were active social media users and would be more exposed or keen to contribute to the survey questionnaire distributed through social media platforms. Malaysian Communications And Multimedia Commission (MCMC) Internet Users Survey (2018) reported that the highest number of Malaysian internet users were aged between 20-29 years old (30%), followed by those aged between 30-39 (25.9%) and 40-49 (17.9%), respectively.

In this study, the cat owners were dominated by the female population. Similarly reported by Debbra et al. (2019), in which majority of household in Putrajaya that has cat(s) as a pet was owned by women. In a city in Indonesia, female pet owners dominated the demography data and frequently visited the animal clinics in Banda Aceh. As to whether what is the preference of women to own pets is not known (Amiruddin et al., 2020). Females had a significantly higher median practice score than male cat owners. It was speculated that women had higher pet attachment levels and owner-pet relationship scales than men (Winefield et al., 2008; Smolkovic et al., 2012), and similar scenarios could be the same among Malaysian pet owners. Lue et al. (2008) reported that individuals with stronger pet-owner bonds were more likely to have higher levels of healthcare for their pets. Another study conducted among male cat owners by Straede & Gates (1993) revealed that males had significantly lower pet attitude scales, less empathy and less patience than female cat owners. However, there was no significant difference in the median attitude score within the gender in this study. It could be speculated that the Malaysian cat owners could be committed to the health and welfare of their cats.

Most of the recruited cat owners claimed they knew cats could succumb to CKD. The respondents revealed that information obtained from online platforms, veterinarians and printed reading materials such as pet books, magazines or newspaper articles were rated as the primary sources of awareness on CKD in cats. In the United Kingdom, Kogan et al. (2018) reported that pet owners frequently used the online platform or referred to their veterinarians for a source of pet health information. The study further revealed that pet owners would seek the source of information and supports from veterinarians and pet owners who experienced similar related issues (Kogan et al., 2010). Owners rely on online platforms to search for cat health facts due to curiosity, wanting to understand better or to clarify information their veterinarian gives (Kogan et al., 2010). Effective communication and information sharing between cat owners and their veterinarians may allow uncertain issues to be clarified or improve understanding. A wide variety of information has been made available, but sometime the written material could be confusing and challenging to comprehend; hence pet owners will use the opportunity to discuss with their veterinarian. Therefore, veterinarians play a vital role in providing clear explanations and maintaining effective communication with clients. Raising awareness is crucial

to ensure pet owners get accurate information and directly improve the healthcare of pets.

In this study, the cat owners in Malaysia generally had adequate knowledge of CKD in cats. But interestingly, there was particularly a question where a majority of the respondents did not know that the clinical signs of CKD were notable when 75% of the kidney structure was damaged. When the respondents were tested on their abilities to identify clinical signs of CKD in cats, it was found that many respondents performed poorly. This scenario was similar as reported by Khalil & Abdalrahim (2014) where it was revealed that most human patients knew about kidney disease, but only half of them had incorrectly identified symptoms in humans. Having the ability to recognise signs of illness by the pet owners is very important as cats rely on their attention and concern for treatment or maintaining good health and well-being. Unfortunately, suppose that cat owners had poor ability to detect abnormal signs or symptoms, then most likely, the affected cat may only get medical attention at a later stage of the disease with a poor prognosis. Therefore, strategies need to be implemented to continuously create awareness and improve the understanding of pet owners about CKD, especially in cats. Improved knowledge among cat owners may allow them to recognise clinical signs, especially at the early stages of CKD and prompt them to bring their cats for check-ups. Despite the irreversible condition of CKD, the prognosis is often better at the early stage. Therapeutic interventions in the initial stage of managing the kidney condition may slow the disease progression and prevent associated complications.

The Malaysian cat owners had a good attitude and practice towards supporting cats with progressive diseases such as CKD. Pet owner's attitudes and acceptance of the therapeutic plan is one of the essential factors that can influence the success of the treatment plan (Polzin, 2013). In this study, many claimed that they adhere to administering the medication according to prescription and will follow the food restriction practice for cats diagnosed with CKD. On the contrary, Markovich et al. (2014) revealed a wide variation in the medication and nutritional practices used among owners with CKD cats in the United States. It was reported that half of them fed a veterinary renal therapeutic diet in combination with other commercial diets. Only half of the cats received subcutaneous fluid and oral medications (Markovich et al., 2014). Besides medication and nutrition, almost half of the respondents (48.3%) brought their cats for health check-ups occasionally, while only 36.3% of the respondents had frequently brought their cats for health check-ups (Markovich et al., 2014). This may be due to pet owners' cost concerns, as most agreed that veterinary services and regular health check-ups were expensive (Lue et al., 2008; Rohlf et al., 2012). Anecdotally, the clinician revealed that some pet owners might opt for wait-and-see how their pets are doing before deciding the next action plan. The benefits of early screening outweigh long-term treatment, especially at the chronic stage of the disease where timely intervention, may slow disease progression (Boyd et al., 2008; Grauer, 2005). Therefore, routine check-ups and screening of kidney functions should be encouraged for the benefits of quality of life for the patient (Khalil & Abdalrahim, 2014), especially at the geriatric age of the cats.

The majority of the respondents recruited in this study had a monthly household income of RM2000-RM5000 (29.0%), followed by RM5001-RM10000 (27.9%) and less than RM2000 (21.2%). The association of monthly household income and KAP scores was investigated as having a pet cat in a household would mean additional expenditure for maintaining these cat(s) as pets. The amount of family expenditures on pets was shown increased with their household salary (Henderson, 2013). This study found no notable difference in monthly household income and KAP scores. Similarly, Lue et al. (2008) reported that veterinary care decisions were made purely on the basis of pet-owner attachment and their perception of the importance of veterinarian recommendations rather than the owner's income.

There was a positive association between education level with attitude and practice of cat owners towards CKD, in which the higher education level resulted in higher median attitude and practice scores. This finding was in contrast with Stanifer et al. (2016), in which the education attainment of participants was a significant factor correlated with knowledge regarding CKD in human patients but not for attitude and practice. There was a significant difference between the median knowledge and median attitude scores among the occupation or study fields found in this study. Having a career or having studies related to life sciences showed that respondents had a better KAP towards cats with CKD. Perhaps, having a science background in education and/or career would allow one to better understand and comprehend clinical knowledge and experiences.

The years of experience in rearing cats were significantly associated with the respondents' knowledge of CKD. Respondents with more than 15 years of experience caring for cats had the highest median knowledge score. It was speculated that this group of cat owners might have gathered more animal-care knowledge while enjoying having cats as a companion. In human medicine, a similar finding was noted where nurses with shorter years of working experience had poorer knowledge of geriatric healthcare than those with more extended professional experience (Amsalu et al., 2021). Furthermore, respondents having cats with chronic illnesses had a significant influence on the median practice score. In a human study about diabetes, a common progressive disease, participants with a family history of diabetes also showed positive practices in their daily life (Rahaman et al., 2017). Similarly, significantly higher median knowledge and practice scores were found in cat owners with experience in handling pets with kidney-related problems. It was speculated that the past experience of cat owners may have allowed them to be well informed about the progressive diseases during their consults with the veterinarians and acknowledged the value of practices in preventing and managing disease. Finally, this study showed positive linear correlations between knowledge with attitude, knowledge with practice, and attitude with practice. This indicated that most cat owners with good knowledge will have desirable attitude and good practice towards CKD, while cat owners with poor knowledge will have undesirable attitude and poor practice.

CONCLUSION

In conclusion, the awareness of CKD in cats among cat owners in Malaysia was good. Perhaps due to the available sources of information such as online source(s), veterinarians and printed reading materials that were quoted to be the primary references for owners to obtain information. The level of KAP of cat owners towards cats with CKD was good. There was an association between cat owners' demographic variables and cat ownership with KAP towards CKD in which the occupation or study field, years of rearing cats and experience in handling pets with kidney-related issues had significantly influenced the knowledge. The education level and types of occupation or study field had significantly influenced the attitude wheres, gender, education level, history of having cats with chronic illnesses and handling pets with kidney-related issues had significantly influenced the practice of cat owners. Lastly, this study revealed positive linear correlations between the KAP of cat owners towards CKD. In summary, implementing planned strategies and educational initiatives such as talks, interactive sessions, and engaging online content is essential for enhancing cat owners' awareness and knowledge. Thus, their attitude and practice towards the intention to treat cats with CKD could also be improved.

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