KNOWLEDGE, ATTITUDE AND PRACTICE OF NEUTERING AMONG DOG OWNERS IN MALAYSIA

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Knowledge, Attitude and Practice of Neutering Among Dog Owners in Malaysia

By

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KNOWLEDGE, ATTITUDE AND PRACTICE OF NEUTERING AMONG DOG OWNERS IN MALAYSIA

ABSTRACT

An abstract of the research paper was presented to the Faculty of Veterinary Medicine, Universiti Malaysia Kelantan, in partial requirement for the course DVT 55204 – Research Project. Neutering is a general term that refers to a surgical procedure involving the removal of the reproductive organs in both male and female dogs. There are several factors that contribute to the challenges associated with neutering in dogs, particularly, high cost of neuter surgery, dogs that are kept for breeding purpose, surgery risk and complication in certain dog breeds, not suitable age and condition of dogs and owners' perception towards animal rights and welfare. However, there is still a lack of understanding and awareness regarding benefits of neutering to eliminate certain reproductive diseases and to control unwanted pregnancies in dogs. This cross-sectional study was carried out to assess the current knowledge, attitude and practice (KAP) regarding neutering of dogs among dog owners in Malaysia using a self-administered questionnaire via Google Form. The study findings showed that dog owners have good knowledge (n = 55, 43.3%), good attitude (n = 59, 46.4%) and moderate practice (n = 59, 46.4%) towards neutering in dogs. This study will benefit the public since the Department of Veterinary Services Malaysia (DVS) and Society for the Prevention of Cruelty to Animals (SPCA) are responsible in taking necessary measures, such as organizing neutering campaigns in order to raise community awareness in controlling stray population. In conclusion, gender, age, area of residential, level of income and education level were the significant factors that influenced dog owners' knowledge, attitude and practice towards neutering in dogs.

Keywords: KAP, Neutering, Dog owners

PENGETAHUAN, SIKAP DAN AMALAN PEMILIK ANJING PELIHARAAN TERHADAP PEMANDULAN ANJING DI MALAYSIA

ABSTRAK

Abstrak daripada kertas penyelidikan dikemukakan kepada Fakulti Perubatan Veterinar, Universiti Malaysia Kelantan untuk memenuhi sebahagian daripada keperluan kursus DVT 55204 – Projek Penyelidikan. Pemandulan adalah istilah umum yang merujuk kepada prosedur pembedahan yang melibatkan pembuangan organ reproduktif pada anjing jantan dan anjing betina. Terdapat beberapa faktor yang menyumbang kepada cabaran yang berkaitan dengan pemandulan pada anjing, terutamanya, kos tinggi pembedahan mandul, anjing yang dipelihara untuk tujuan pembiakan, risiko pembedahan dan komplikasi pada beberapa jenis baka anjing, usia dan keadaan anjing yang tidak sesuai, serta persepsi pemilik anjing terhadap hak dan kebajikan haiwan. Namun, masih terdapat kekurangan pemahaman dan kesedaran mengenai faedah pemandulan untuk menghapuskan penyakit reproduktif tertentu dan mengawal kehamilan yang tidak diingini pada anjing betina. Kajian keratan lintang ini dilakukan untuk menilai pengetahuan, sikap, dan amalan semasa berkaitan dengan pemandulan pada anjing dalam kalangan pemilik anjing di Malaysia menggunakan soal selidik melalui '*Google Form'*. Dalam kajian ini, didapati bahawa pemilik anjing mempunyai pengetahuan yang baik (*n* = 55, 43.3%), sikap yang baik (*n* = 59, 46.4%) dan melaksanakan amalan yang sederhana (*n* = 59, 46.4%) terhadap pemandulan anjing. Hasil kajian ini akan memberi manfaat kepada orang ramai kerana Jabatan Perkhidmatan Veterinar Malaysia (JPVM) dan Persatuan Pencegah Penganiayaan Terhadap Haiwan bertanggungjawab mengambil langkah-langkah yang diperlukan, seperti menganjurkan kempen pemandulan anjing untuk meningkatkan kesedaran masyarakat dalam mengawal populasi anjing liar. Kesimpulannya, jantina, umur, kawasan kediaman, pendapatan, dan tahap pendidikan adalah faktor-faktor penting yang mempengaruhi pengetahuan, sikap, dan amalan pemilik anjing terhadap pemandulan anjing.

Kata kunci: Pengetahuan, sikap dan amalan, Pemandulan pada anjing, Pemilik anjing

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UMK	Universiti Malaysia Kelantan
DVM	Doctor of Veterinary Medicine
FPV	Faculty of Veterinary Medicine
KAP	Knowledge, Attitude and Practice

CHAPTER 1

INTRODUCTION

1.1 Introduction

Overall, neutering in both male and female dogs contributes to the reduction of fatal reproductive diseases, eliminates unwanted behaviours and reduces the risks of infectious diseases resulting in an increased lifespan of dogs (Hoffman et al., 2013). This can also help to cut down the cost of consulting a veterinarian for diagnosing, treating and managing these conditions. Neutering also plays an essential role in preventing the exponential growth of stray dog populations to stop further breeding, it decreases the occurrence of unwanted puppies and breaks the cycle of overpopulation of strays. This will then contribute to reducing the transmission of disease among stray dogs that also may be zoonotic and affecting the health of humans.

However, the perception regarding neutering among local dog owners is unknown. Therefore, the aim of this study is to investigate the level of knowledge, attitude and practice among dog owners in order to promote responsible pet ownership and maximize the benefits of neutering in terms of population control, health outcomes, and behavioural aspects. Based on my observation, many dog owners are uncertain about the advantages of neutering, which is caused by the lack of knowledge, attitude, and practice in reducing, preventing, and treating certain diseases through neutering. Hence, this study is being conducted to assess the knowledge, attitude and practice regarding the benefits of neutering among dog owners, while also raising awareness about reducing, preventing and treating certain diseases through neutering of dogs in Malaysia.

1.2 Research Problem Statement

Since neutering in dogs is well-documented for population control, behavioural improvements and control of reproductive diseases, some dog owners are not well-aware on this matter due to lack of knowledge regarding neutering in pets and the benefits of neutering. Public awareness on neutering among dog owners in Malaysia will assist in the control of disease transmission, especially in stray dogs and reduce unwanted pregnancies. As a result, this study is being carried out to determine the level of knowledge, attitude and practice regarding neutering among dog owners in Malaysia, which will assist in raising awareness of the benefits of neutering dogs in the country since this study has not been done in Malaysia. However, similar studies have been done in the UK, (Diesel et al., 2010).

1.3 Research Questions

1.3.1 What is the level of knowledge among dog owners about neutering?

1.3.2 What is the level of attitude of dog owners toward neutering?

1.3.3. What is the level of practice among dog owners toward neutering?

1.4 Research Hypothesis

H_{01}: Dog owners have poor level of knowledge of neutering in dogs

H_{A1}: Dog owners have good level of knowledge of neutering in dogs

H_{02}: Dog owners have poor level of attitude towards neutering in dogs

H_{A2}: Dog owners have good level of attitude towards neutering in dogs

H_{03}: Dog owners have poor practice towards neutering in dogs

H_{A3}: Dog owners have moderate practice towards neutering in dogs

1.5 Research Objectives

1.5.1 To determine the level of knowledge of neutering among dog owners in Malaysia

1.5.2 To determine the level of attitude towards neutering among dog owners in Malaysia

1.5.3 To determine the level of practice on neutering among dog owners in Malaysia

CHAPTER 2

LITERATURE REVIEW

2.1 Definition of Neutering

Neutering is a general term that refers to a surgical procedure involving the removal of the reproductive organs in both male and female dogs. Neutering has been observed to increase life expectancy by 13.8% in male dogs and 26.3% in female dogs (Hoffman et al., 2013).

2.2 Terms Used and Definition

In male dogs, castration is a common surgical procedure that involves in the removal of both testicles and stops all production of sex hormone effects (Wongsaengchan & McKeegan, 2019). This procedure aims to sterilize the male dog, preventing its ability to breed, thus, contributing to the population control and reducing the need for euthanasia.

In female dogs, spaying is a common surgical procedure that involves in the removal of both ovaries (ovariectomy) resulting in infertility or removal of both ovaries and uterus (ovariohysterectomy, OHE) resulting in sterility (Wongsaengchan & McKeegan, 2019). Infertility refers to the inability to fertilize, conceive and produce offspring, however, it can still produce and release sex hormones such as oestrogen and progesterone which play important role in regulating the reproductive cycle. Infertility can be caused by various factors such as hormonal imbalance, reproductive disorders or structural abnormalities. On the other hand, sterility implies a more permanent and irreversible condition resulting from the inability to fertilize and produce offspring due to an inability to produce and release sex hormones. Sterility is the outcome from the surgical procedure of ovariohysterectomy (OHE).

2.3 Benefits of Neutering

The benefits of castration include reduction of unwanted and undesirable behaviour that cause inconvenience to their owners. Male dogs commonly experience behavioural changes as a result of hormonal alterations. These changes typically contribute to a reduction in sexual behaviours, such as mounting and roaming in search of potential mates, as well as a diminished interest in females on heat. Aggressive behaviours, particularly dominance and competition for mates, are often reduced after castration. Moreover, castrated dogs also show decrease in urine marking and territorial behaviour, thus, they are less likely to urinate in various areas to establish their territory and mark their scent. As a result, dog owners will experience a more hygienic and odour-free environment, with a reduced need for extensive cleaning. However, the consequences of castration are vary based on the dog's temperament and it does not influence all behavioural patterns, since not all behaviours are influenced by sex hormones (Kaufmann et al., 2017).

The benefits of spaying female dogs include eliminating unwanted pregnancies to reduce the stray population which can become the source of potential spread of disease. Additionally, spaying also contributes to a decrease in oestrus-associated behaviours which, can help in reducing roaming tendencies in search of a mating partner and thereby prevents the occurrence of sexually transmitted diseases in female dogs (Mckenzie, 2010).

In female dogs, OHE has been recommended as a preventive measure against the risk of being infected with pyometra, a potentially life-threatening bacterial infection characterized by the accumulation of pus in the uterus. Pyometra can lead to severe complications such as sepsis, septic shock, peritonitis, systemic bacterial infection, and multi-organ failure (Pugliese, et al., 2020). Studies have shown that the mortality rate associated with pyometra, including cases where euthanasia was performed, is approximately 10%, whereas in treated dogs, it reduces to 1% (Starling et al., 2019). It is also stated that the most common neoplasia in bitches is

mammary gland neoplasia with 3.4% being affected and the risk of being infected in sexually intact bitches are seven times higher compared to neutered bitches (Kustritz, 2011).

Additionally, castration in male dogs contributes to the prevention of androgen-induced diseases such as benign prostatic hyperplasia (BPH), perineal hernia, prostatitis and testicular tumours (Wongsaengchan et al., 2019). Moreover, castrated dogs are less likely to get infectious disease, trauma, vascular disease and degenerative disease (Hoffman et al., 2013). However, castration is reported to increase the risk of obesity and some of musculoskeletal degenerative diseases such as hip dysplasia and cranial cruciate rupture (Wongsaengchan et al., 2019).

2.4 Possible Complications

Neutering procedure requires general anaesthesia. The need for general anaesthesia is defined as loss of sensation to pain with unconsciousness and is based on two essential requirements, mainly, to provide analgesia and to induce partial or complete immobility. The estimation of the patient's anaesthetic risk is based on the classification by the American Society of Anaesthesiologists (ASA) which serves as a grading system for pre-anaesthesia risk status of the patients (Sawyer, 2007). Study shows that brachycephalic dog breeds are more prone to experience surgical complications such as respiratory obstruction during anaesthesia and recovery period compared to non-brachycephalic dogs due to their unique anatomical features of the head with a square skull and a shortened and flattened muzzle (Blaszczyk et al., 2021). This include stenotic nares, aberrant nasal conchae, elongated soft palate, everted laryngeal saccules, laryngeal collapse, hypoplastic trachea of various severities, and bronchial collapse that is characterized by brachycephalic airway syndrome which causes upper airway obstruction that most often affects French bulldogs, English bulldogs, Shih Tzu, pugs, Boston terriers and Pekingese (Himel et al., 2023).

Furthermore, there are also negative consequences of neutering in both male and female dogs. The loss of oestrogen hormone lowers the metabolism rate which results in a decrease in their energy needs. Therefore, neutering has been linked closely to obesity in dogs due to low metabolic rate, high feed intake and reduced activity. Obesity, in turn, may elevate the risk or worsen conditions like osteoarthritis and other systemic illnesses. Dog owners should receive guidance and information on adjusting their dog's activity levels and feed intake to maintain an optimal body score condition (Oberbauer, 2019).

In another study, complication have been reported during and after ovariohysterectomy (OHE). This includes haemorrhage of the right and left ovarian pedicle during surgery and haemorrhage of the subcutaneous tissue, wound inflammation, discharge and pseudopregnancy after surgery (Burrow et al., 2005). However, this can be prevented by practicing an appropriate aseptic technique during surgery and post-operative care. The goals of aseptic technique are to prevent cross-contamination during surgery and to minimize the entry of microorganisms in the surgical environment (White, 2020). Furthermore, proper haemostatic techniques during surgery can also prevent further complications such haemorrhage.

2.5 Dog Owner's Knowledge towards Neutering

In a previous study, it is suggestive that dog owners may have lack of knowledge regarding the potential short-term side effects of neutering procedure (Ong et al., 2017). Moreover, it is reported that previous researchers also discovered an inadequate understanding about the consequences of pet neutering among men and women (Fielding et al., 2015). Due to lack of information on neutering decisions, pet owners may not fully understand the value of the neutering procedure (Downes et al., 2015). Moreover, it is evident that a large proportion of pet owners stated that animal care comes first before cost, therefore, imprecise and insufficient information provided becomes a more significant concern for them compared to cost (Coe et

al., 2007). Hence, it is possible that the lack of knowledge of dog owners might be closely related to poor communication between veterinarians and clients (Ong et al., 2017).

2.6 Dog Owner's Attitude towards Neutering

In a previous study, the attitude of dog owners towards neutering can be influenced by various social factors such as age, political views, religion, education, life experience, cultural differences and socioeconomic status (McKay et al., 2009). For instance, researcher indicates that younger owners tend to be more inclined to allow their pets to breed and are therefore less likely to have their dogs neutered compared to older owners. Additionally, other studies have shown that the gender of the owner plays a role in attitudes towards dog neutering, with male owners being less likely to neuter their male dogs due to a perceived connection with their pet's sexuality. (Fielding et al., 2015) The study also found out that female owners tend to be more humanistic and moralistic towards the welfare and wellbeing of their dogs, hence, there are more negative aspects shown towards neutering due to the risk of surgery and pain (Faver, 2009). Therefore, study results suggest that there are contrasting views on negative aspects, importance and required outcome of dog neutering between the genders of dog owners (Ong et al., 2017).

2.7 Dog Owner's Practice towards Neutering

In a previous study, a large number of dogs owners' population stated that neutering of male and female dogs is recommended if they are not used for breeding purposes. There are also other variables such as advises of delaying neuter if they are physically immature and recommend one season for the bitch to complete her first heat cycle before spaying them (Diesel et al., 2010).

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Study area

This study was conducted in Malaysia

3.2 Study design

This study was conducted using a cross-sectional study design

3.3 Study population

This study was conducted among dog owners in Malaysia

3.4 Selection criteria

Inclusion criteria

- Dog owner
- Malaysian or resident of Malaysia
- Age 18 to 70 years old
- Able to read and understand Bahasa Melayu and English.

Exclusion criteria

- Not a dog owner
- Non-Malaysian and not a resident of Malaysia
- Age below 18 and above 70 years old
- Not able to read and understand Bahasa Melayu and English

3.5 Sampling Method

A cross-sectional study design was conducted to evaluate the level of knowledge, attitude and practice of neutering among dog owners in Malaysia by using a self-administered

questionnaire. The Google form was blasted on all social media platforms, such as Facebook, WhatsApp, Telegram, and Instagram. Non-probability sampling is used which is convenience sampling method.

3.6 Sample Size Calculation

The sample size for this study is calculated by using the following formula:

Sample size, n =

$$N\ x\ \frac{\frac{Z^2\ x\ p\ x\ (1-p)}{e^2}}{[N-1+\frac{Z^2\ x\ p\ x\ (1-p)}{e^2}]}$$

where,

N = Population size

Z = Critical value of the normal distribution at the required confidence level

p = Sample proportion

e = Margin of error

According to Malaysia Pet Market Insights (Pet Fair Southeast Asia, 2021), the total population of dog ownerships is estimated at 398 000 in the year of 2021. By calculating the sample size using the formula above, it was estimated that a minimum of 384 individuals should be involve in this study, where Z is 95% (1.96) confidence level, p is 0.5 sample proportion and e is 0.05 margin error.

3.7 Design of the questionnaire

The items in the questionnaires were developed following extensive literature search. Previous studies conducted in UK, were adopted for this study with some modifications (Diesel

et al., 2010) and (McKeegan, 2019). The items included were validated by panel experts from public health and small animal medicine to improve the context of the items to reflect the situation in Malaysia. The final questionnaire consists of five sections which includes socio-demographic information, pet's information, knowledge, attitude and practice. The first section is about pet owner's socio-demographic information which include gender, age, race, religion, state, area of residential, employment status, salary, education level and a question about if they would want to neuter their dog or not. The second section is about pet's information that comprises of dog gender, age, breed and neuter status. The third section is about knowledge of dog owners towards neutering in dogs which consists of one question and eight statements. The answers choice given were "yes" (1 point), "no" (0 point), and "I don't know" (0 point) using a scoring system. Respondents with 0 to 3 points will be considered as poor, 4 to 6 points as moderate and 7 to 9 points as good knowledge level. The fourth section is about attitude of dog owners towards neutering in dogs which consist of six statements using 5-point Likert-scale. The answers choice given were "strongly disagree" (1 point), "disagree" (2 points), "neutral" (3 points), "agree" (4 points) and "strongly agree" (5 points). Respondents with 0 to 10 points will be considered as poor, 11 to 20 points as moderate and 21 to 30 points as good attitude. The last section is about practice of dog owners towards neutering in dogs which consist of 4 questions and 2 statements using 4-point Likert-scale. The answers choice given were "never" (1 point), "rarely" (2 point), "often" (3 points) and "always" (4 points). The total points for each section were then calculated. Respondents with 0 to 8 points will be considered as poor, 9 to 16 points as moderate and 17 to 24 points as good practice. The questionnaire is composed of two languages which are English and Bahasa Melayu.

3.8 Statistical Analysis of Data

The data were analysed using IBM® SPSS® Version 26 (IBM®, USA). The categorical variables were summarized using frequency and percentage. Association between the levels of

KAP and the demographic characteristics were analysed using Chi Square test. A *p*-value of ≤0.05 was considered significant. Pearson correlation coefficient was used to describe the strength and direction of the relationship among knowledge, attitude and practice (KAP).

CHAPTER 4

RESULT

A total of 150 individuals participated in this study, however, only 127 individuals were included in the final analysis after excluding those with missing data and does not meet the requirements of the study criteria.

4.1 Socio-demographic Characteristics of Respondents

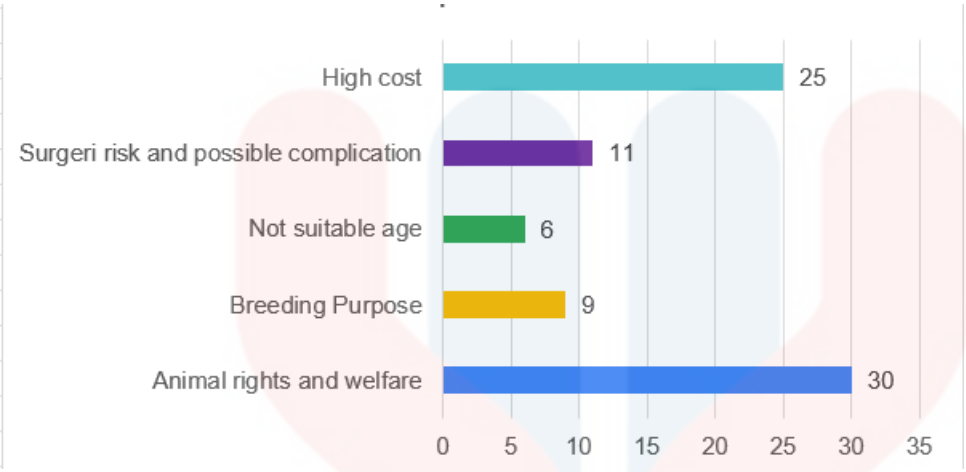
The result from this study showed that 84.7% (*n* = 127/150) of the respondents included in the study were mostly females (56.69%, *n* = 72). Respondents from the age group of 26 to 39 years old (37.80%, *n* = 48) answered the questionnaire the most. Similarly, majority of the respondents were Hindu (46.46%, *n* = 59) and a high number of respondents stayed in urban areas, (58.27%, *n* = 74). Most of them are earning around RM 2500 to RM 4850 that can be classified into B4 group under B40. The education level also varies, where the highest education level among them is degree, (41.7%, *n* = 53), followed by pre-university level, (27.6%, *n* = 35). The data also shows (37.0%, *n* = 47) respondents would want to neuter their dogs while (63.0%, *n* = 80) choose to not neuter their dogs. The summary of the demographics is shown in Table 4.1.

While Figure 4.1 shows the reasons of respondents that choose to not neuter their dogs, with (37.5%, *n* = 30) have the highest number due to animal rights and welfare.

Table 4.1: Demographics of the survey respondent (*n* = 130)

Socio–demographic characteristics	Total (n = 127)	
	n	%
Gender		
Male	55	43.31
Female	72	56.69
Age (Year)		
18 – 25	42	33.07
26 – 39	48	37.80
40 – 59	26	20.47
60 – 70	11	8.66
Religion		
Buddha	22	17.32
Islam	9	7.09
Christian	37	29.13
Hindu	59	46.46
Area of residential		
Urban	74	58.27
Suburban	42	33.07
Rural	11	8.66
Salary		
None	29	22.83
<RM 2500	27	21.26
RM 2500 – RM 4850	48	37.80
RM 4850 – RM 10970	11	8.66
>RM 10970	12	9.45
Education Level		
Primary School	8	6.30
Secondary School	26	20.5
Pre-university	35	27.6
Degree	53	41.7
Master	4	3.1
PhD	1	0.79
Do you want your dog to be neuter?		
Yes	47	37.0
No	80	63.0

Figure 4.1: The reasons why respondents did not agree to neuter their dogs.



4.2 Knowledge of Neutering in Dogs

Based on Table 4.2, out of 127 respondents, (56.7%, *n* = 72) of them were females while (43.3%, *n* = 55) of them were male. The data shows that females have higher knowledge (50%, *n* = 36), compared to males. Additionally, the age group of 18 to 25 years old answered most of the correct answers, who scored 7 to 9 points (66.7%, *n* = 28), compared to respondents within age 26 to 39 (43.8%, *n* = 21). Knowledge was good for responses from Hindu religion (39.0%, *n* = 23). High knowledge level can be seen in respondents living in urban area (58.1%, *n* = 43), while low knowledge level respondents can be seen living in suburban area (57.1%, *n* = 24). Respondents who did not earn any income showed the highest knowledge of neutering in dogs, (65.5%, *n* = 19), compared to others. Furthermore, most of them from degree holder have a higher knowledge about neutering (73.6%, *n* = 39), compared to pre-university level (57.1%, *n* = 20). The demographic variables include age, area of residential, salary and education level showed significant value ($p < 0.05$).

Table 4.2: Knowledge Responses of Dog Owners

	High Frequency (%)	Moderate Frequency (%)	Low Frequency (%)	P value
Gender				0.212
Male	34.5	16.4	49.1	
Female	50.0	13.9	36.1	
Age (Year)				<0.001
18 – 25	66.7	14.3	19.0	
26 – 39	41.7	14.6	43.8	
40 – 59	26.9	15.4	57.7	
60 – 70	0.0	18.2	81.8	
Religion				0.263
Buddha	36.4	4.5	59.1	
Islam	44.4	11.1	44.4	
Christian	54.1	10.8	35.1	
Hindu	39.0	22.0	39.0	
Area of Residential				0.001
Urban	58.1	13.5	28.4	
Suburban	23.8	19.0	57.1	
Rural	18.2	9.1	72.7	
Salary				<0.001
None	65.5	10.3	24.1	
<RM 2500	14.8	7.4	77.8	
RM 2500 – RM 4850	29.2	20.8	50.0	
RM 4850 – RM 10970	72.7	18.2	9.1	
>RM 10970	83.3	16.7	0.0	
Education Level				<0.001
Primary School	0	0	100.0	
Secondary School	11.5	15.4	73.1	
Pre-University	25.7	17.1	57.1	
Degree	73.6	15.1	11.3	
Master	75.0	25.0	0	
PHD	100.0	0	0	

4.3 Attitude of Neutering in Dogs

Table 4.3 shows females have higher attitude towards neutering, (56.9%, $n = 41$) compared to males. Respondents from age group of 18 to 25 years old answered most of the attitude questions correctly (71.4%, $n = 30$), as compared to other age groups. The result also shows respondents from Hindu religion have a high attitude towards neutering in dogs (45.8%, $n = 27$). Those who are living in urban areas have higher attitude towards neutering (56.8%, $n = 42$), while respondents from suburban have lower attitude towards neutering (19.0%, $n = 8$). Respondents who did not earn any income shows the highest attitude towards neutering in dogs (65.5%, $n = 19$), compared to others. Those who have pre-university level of education shows low attitude (14.3%, $n = 5$), while those in degree level shows high attitude towards neutering (77.4%, $n = 41$). All demographic variables were found significant, except religion ($p < 0.05$).

Table 4.3: Attitude Responses of Dog Owners

	High Frequency (%)	Moderate Frequency (%)	Low Frequency (%)	P value
Gender				0.024
Male	32.7	54.5	12.7	
Female	56.9	33.3	9.7	
Age (Year)				<0.001
18 – 25	71.4	19.0	9.5	
26 – 39	45.8	47.9	6.3	
40 – 59	26.9	61.5	11.5	
60 – 70	0.0	63.6	36.4	
Religion				0.924
Buddha	45.5	45.5	9.1	
Islam	44.4	55.6	0	
Christian	48.6	40.5	10.8	
Hindu	45.8	40.7	13.6	
Area of Residential				0.022
Urban	56.8	36.5	6.8	
Suburban	35.7	45.2	19.0	
Rural	18.2	72.7	9.1	
Salary				0.005
None	65.5	24.1	10.3	
<RM 2500	25.9	63.0	11.1	
RM 2500 – RM 4850	33.3	50.0	16.7	
RM 4850 – RM 10970	81.8	18.2	0.0	
>RM 10970	66.7	33.3	0.0	
Education Level				<0.001
Primary School	0.0	62.5	37.5	
Secondary School	11.5	80.8	7.7	
Pre-University	31.4	54.3	14.3	
Degree	77.4	15.1	7.5	
Master	75.0	25.0	0.0	
PHD	100.0	0.0	0.0	

4.4 Practice of Neutering in Dogs

Table 4.4 shows female have a higher practice level towards neutering (45.8%, n = 33), as compared to males. Additionally, respondents within age 40 to 59 shows the lowest practice towards neutering (26.9%, n = 7), while respondents within age of 18 to 25 shows the highest practice (54.8%, n = 23). Hindu respondents show the highest of practice in neutering (39.0%, n = 23), compared to other religion. Furthermore, respondents living in urban area practice neutering more (51.4%, n = 38), than those living in suburban and rural areas. Respondents who do not earn any financial income showed the highest-level practice of neutering in dogs (55.2%, n = 16), compared to those who are earning. Those who have degree level also shows the highest practice (66.0%, n = 35), as compared to others. There is significant value for all demographic variables ($p < 0.05$), except religion.

Table 4.4: Practice Responses of Dog Owners

	High Frequency (%)	Moderate Frequency (%)	Low Frequency (%)	P value
Gender				0.033
Male	27.3	49.1	23.6	
Female	45.8	44.4	9.7	
Age (Year)				0.002
18 – 25	54.8	40.5	4.8	
26 – 39	37.5	50.0	12.5	
40 – 59	26.9	46.2	26.9	
60 – 70	0.0	54.5	45.5	
Religion				0.851
Buddha	31.8	59.1	9.1	
Islam	33.3	55.6	11.1	
Christian	40.5	40.5	18.9	
Hindu	39.0	44.1	16.9	
Area of Residential				0.004
Urban	51.4	39.2	9.5	
Suburban	19.0	54.8	26.2	
Rural	18.2	63.6	18.2	
Salary				0.003
None	55.2	34.5	10.3	
<RM 2500	11.1	74.1	14.8	
RM 2500 – RM 4850	29.2	47.9	22.9	
RM 4850 – RM 10970	63.6	27.3	9.1	
>RM 10970	66.7	25.0	8.3	
Education Level				<0.001
Primary School	0.0	50.0	50.0	
Secondary School	7.7	76.9	15.4	
Pre-University	20.0	60.0	20.0	
Degree	66.0	26.4	7.5	
Master	75.0	0.0	25.0	
PHD	100.0	0.0	0.0	

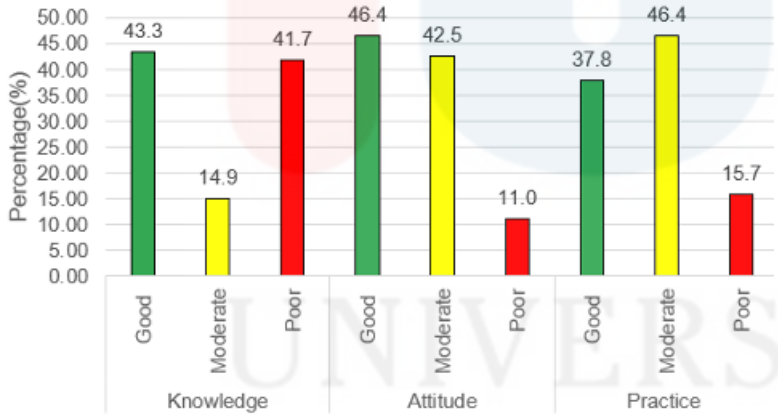
4.5 Correlation between KAP Scores

The correlation revealed significant positive linear correlations between knowledge and attitude (r = 0.864, $p < 0.001$). The data also shows the correlation between knowledge and practice (r = 0.761, $p < 0.001$), and attitude and practice (r = 0.836, $p < 0.001$). The result reaffirmed a strong correlation between knowledge, attitude, and practice with neutering among dog owners in Malaysia KAP scores.

4.6 Percentage between KAP Scores

Figure 4.6 shows a bar graph illustrating the percentage between knowledge, attitude, and practice (KAP) of the 127 respondents. Dog owners have good knowledge (n = 55, 43.3%), good attitude (n = 59, 46.4%) and moderate practice (n = 59, 46.4%) towards neutering in dogs.

Figure 4.6: Percentage between KAP of the 127 respondents



CHAPTER 5

DISCUSSION

This study investigated the dog owners' knowledge, attitude and practice (KAP) regarding neutering in dogs. For the findings, it was suggested that age group of 18 to 25 years old has a good knowledge level where they scored 7 to 9 points in knowledge section, good attitude level who scored 21 to 30 points, and good practice level who scored 17 to 24 points. The age group of 18 to 25 years old showed the highest score points when being asked about the consequences of neutering, behaviour of neutered dogs and importance of neutering for knowledge question. They also scored the highest score when being tested on the suitable age to neuter dogs, if that neutering can reduce the spread of disease and the need of euthanasia, the condition of dogs during surgery and the chances of reducing sexually transmitted diseases (STD) in neutered dogs for attitude question. As for the practice question, they also answered most of the questions correctly about following their veterinarian's advice on the decision to neuter their dogs, neutering brings more advantage than disadvantage and would they practice neutering their dogs. Younger age groups presumably have more access and exposure to resources such as articles, magazines, books, journal and to the Internet, social media such as Instagram, Facebook, Twitter, Tiktok that educated them about neutering in dogs (Downes et al., 2015). Additionally, younger individuals presumably have more recent education experiences and learning opportunities that often incorporated them with the latest information, thus, contributing to a perception of higher knowledge among younger age groups compared to the older age groups.

As for the area of residential, respondents from urban shows a good knowledge level, good attitude level, and good practice level. This is presumably due to residents from urban areas have more access to educational institutions such as school, college, universities and libraries

(Wood, 2023). This can provide the residents with better access to information and a wider range of learning opportunities about neutering (Glasser, 2021). Additionally, urban areas presumably have more veterinary clinics compared to suburban and rural areas, thus, this facilitates the exchange of ideas and knowledge between a veterinarian and the client that helps to educate and increase awareness regarding neutering of pets. Furthermore, there are also lack of veterinary professionals reported in rural areas due to unfavourable working conditions such as travelling long distances, climate conditions, long shifts, and others (Brussels, 2020). Since it is an urban area, the technological infrastructure are better, hence, there is greater access to technology and the internet becomes the powerful tool to learn and access information about neutering in dogs.

As for the level of income, individuals who did not earn any income showed a good knowledge level, good level of attitude, and good practice level of neutering. This is presumably due to pet owners may have spent more time with their dogs, which encouraged them to read and research more about the importance of neutering and the consequences if they fail to neuter their dogs. Based on my observation, most of these individuals falls under stay home parent or a full-time student. Additionally, they may have frequent visits to the veterinary clinic to bring their pets for checkups and the veterinarian might educate them about neutering in dogs, thus, effective communication can be observed (Downes, et al., 2015). In contrast to most working employees, time constraint may be a factor in why there is low level of knowledge, attitude and practice in working individuals.

For the level of education, individuals from a degree holder showed a good level of knowledge, attitude and practice of neutering in dogs. This is presumably because individuals from a degree holder of dog owners may have higher critical thinking skills and deeper understanding compared to other education levels on the benefits of neutering in dogs. Additionally, degree students may have better access to libraries, research facilities and expert

faculty members that can enhance their learning experience, thus, contributing to deeper understanding regarding neutering in animals (Coe et al., 2007).

Females show a higher level of attitude and practice as compared to males. According to an article, males disagree to neuter their dogs because they wanted to keep the dog for breeding purpose (Fielding et al., 2002). They also had negative perception towards neutering such as changes in personality due to removed maleness after castration that can change the personality of the pet (Downes et al., 2015).

However, there are some limitations of the study since the target sample size could not be reached and there is so many missing data such as incomplete answers in the pet's information section. Therefore, the result may not be used to generalise the entire population in Malaysia. The sampling method used in this study is non-probability sampling, thus, there could be possible bias because they may favour certain groups over others. This can result in a sample that does not reflect the diversity of the entire population.

CHAPTER 6

CONCLUSION

In conclusion, this study demonstrated a good level of knowledge, good level of attitude and moderate level of practice in neutering among dog owners in Malaysia. This study offered the opportunity to determine how well dog owners understand and practice neutering in dogs. However, there remains a knowledge gap among dog owners and additional efforts should be made to educate pet owners about neutering in pets because this helps to reduce stray population. Therefore, there will be lower chances of disease transmission between dogs and from dogs to humans. Continuous education and awareness programs are required to increase the knowledge, attitude and practice of neutering among dog owners in Malaysia.

REFERENCE

1. Blaszczyk, L.F., Seremak, B. (2021). Negative Health Changes in Brachycephalic Dogs Resulting From Breeding Pressure – A Review. *Journal of National Research Institute of Animal Production,* Vol. 48, No 1: 15-28.
2. Burrow, R., Batchelor, D., & Cripps., P. (2005). Complications observed during and after Ovariohysterectomy of 142 bitches at a veterinary teaching hospital. *The Veterinary Record 157*(26), 829-833. https://doi.org/10.1136/vr.157.26.829
3. Brussels (2020). Shortage of veterinarians in rural and remote areas, summary report. *Federation of Veterinarians of Europe.* https://2020.fve.org
4. Coe, J. B., Adams, C. L., & Bonnett, B. N. (2007). A focus group study of veterinarians' and pet owners' perceptions of the monetary aspects of veterinary care. *Journal of the American Veterinary Medical Association, 231*(10), 1510–1518. https://doi.org/10.2460/javma.231.10.1510
5. Diesel, G., Brodbelt, D., & Laurence, C. (2010). Survey of veterinary practice policies and opinions on neutering dogs. *Veterinary Record*, 166(15), 455–458. https://doi.org/10.1136/vr.b4798
6. Downes, M. J., Devitt, C., Downes, M. T., & More, S. J. (2015). Neutering of cats and dogs in Ireland; pet owner self-reported perceptions of enabling and disabling factors in the decision to neuter. *PeerJ* 3:e1196. https://doi.org/10.7717/peerj.1196
7. Fielding, W. J., Samuels, D., & Mather, J. (2015). Attitudes and actions of West Indian dog owners towards neutering their animals: A gender issue? *A multidisciplinary journal of the interactions between people and other animals, Vol 15*(3), 206–226. https://doi.org/10.2752/089279302786992487
8. Glasser, C.L. (2021). Attitudes Toward Spay/Neuter in the US Population: Urban/Rural, Cat/Dog, and Demographic Differences. *A multidisciplinary journal of*

the interactions between people and other animals. 93-107. https://doi.org/10.1080/08927936.2021.1874112

9. Hoffman, J.M., Creevy, K.E., & Promislow, D.E.L. (2013) Reproductive Capability Is Associated with Lifespan and Cause of Death in Companion Dogs. *PLoS ONE 8*(4): e61082. https://doi.org/10.1371/journal.pone.0061082
10. Himel, C. J., Linden, D. S., Grimes, J. A., Thieman Mankin, K. M., Coggeshall, J. D., Coggeshall, W. S., & Matz, B. M. (2023). Staphylectomy in nonbrachycephalic dogs: A retrospective study of 27 cases. *The Canadian veterinary journal = La revue veterinaire canadienne*, *64*(8), 765–772.
11. Kaufmann, C. A., Forndran, S., Stauber, C., Woerner, K., & Ganssloßer, U. (2017). The Social Behaviour of Neutered Male Dogs Compared to Intact Dogs (*Canis Lupus Familiaris*): Video Analyses, Questionnaires and Case Studies. *Vet Med Open J*. 2(1): 22–37. https://doi.org/10.17140/vmoj-2-113
12. Kustritz, M.R. (2011). Determining the Best Age at Which to Spay or Neuter a Dog. *PetMD, American Veterinary Medical Association*. https://www.petmd.com
13. Mckenzie, B. A. (2010). Evaluating the benefits and risks of neutering dogs and cats. *Veterinary Science*, 5(45). https://doi.org/10.1079/pavsnnr20105045
14. McKay, S.A., Farnworth, M.J., & Waran, N.K. (2009). Current Attitudes Toward, and Incidence of, Sterilization of Cats and Dogs by Caregivers (Owners) in Auckland, New Zealand. *Journal of Applied Animal Welfare Science, Vol 12*(4), 331-334. https://doi.org/10.1080/10888700903163617
15. Oberbauer, A. M., Belanger, J.M., & Famula T.R. (2019). A Review of the Impact of Neuter Status on Expression of Inherited Conditions in Dogs. *Veterinary Humanities and Social Sciences, Vol. 6*. https://doi.org/10.3389/fvets.2019.00397

16. Ong, D., De Moura Santos, M.J.B., Thomsen, D.A, & Feakes, A.M. (2017). Australian owners' attitudes and experiences of having a dog neutered. *Australian Veterinary Practitioner, 47*(4): 102-108. https://hdl.handle.net/2440/118632
17. Pugliese, M., La Maestra, R., Passantino, A., Cristarella, S., De Majo, M., Biondi, V., & Quartuccio, M. (2020). Electrocardiographic Findings in Bitches Affected by Closed Cervix Pyometra. *Veterinary Sciences,* 7(4), 183. https://doi.org/10.3390/vetsci7040183
18. Starling, M., Fawcett, A., Wilson, B., Serpell, J., & McGreevy, P. (2019). Behavioural risks in female dogs with minimal lifetime exposure to gonadal hormones. *PloS one*, *14*(12), e0223709. https://doi.org/10.1371/journal.pone.0223709
19. Sawyer, D.C. (2007). The Preanesthetic Period. In C.C. Cann & S.L. Hunsberger, *The Practice of Veterinary Anesthesia: Small Animals, Birds, Fish and Reptiles.* (pp. 2-51). United States of America: Teton Newmedia.
20. Wongsaengchan, C., & McKeegan, D. E. F. (2019). The Views of the UK Public Towards Routine Neutering of Dogs and Cats. *Animals: an open access journal from MDPI*, 9(4), 138. https://doi.org/10.3390/ani9040138
21. White, S. (2020). Asepsis. *High-Quality, High-Volume Spay and Neuter and Other Shelter Surgeries.* (pp. 65-88). United States of America: Wiley Blackwell
22. Wood, R.M. (2023). A Review on Education differences in Urban and Rural Areas. *International Research Journal of Educational Research Vol 14*(2), 1-3. DOI 10.14303/2141-5161.2023.254