KNOWLEDGE, AWARENESS AND PREVENTION OF RABIES AND FREE ROAMING DOGS IN PENANG

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ABSTRACT. Free roaming dogs (FRDs) are defined as unconfined dogs and are not prevented from roaming. In Malaysia, the status quo of our FRDs and its management is inconclusive. This study was initiated after the 2015 rabies outbreak in Penang and many parties have been involved in their management. Henceforth, this survey was conducted to determine the status quo of FRDs and its management, concomitantly with the other details than comes along with it. Many aspects of these FRDs welfare knowledge were included in the questionnaire and analysed accordingly. Basic analysis for 157 public respondents that consist of locals of Penang had been accomplished, which brought to a success rate of 78.5%. Statistical analysis has been conducted to identify the knowledge, awareness and prevention of Rabies and FRDs. Our survey also reported that 40% agreed that rabies is a problem in Malaysia and 70% of respondents believed that children are at high risk of contracting it. Sixty-nine percent were not knowledgeable about rabies and its zoonotic implications. In conclusion, it was noted that the overall awareness and understanding level of Rabies knowledge is unsatisfactory. The results showed public concern towards FRDs and encouraged the authorities to seek out improved methods of population and FRDs control which is humane and acceptable in society.

Keywords: Free roaming dogs (FRDs), Penang, rabies, knowledge, awareness, prevention

INTRODUCTION

Dogs were first domesticated by humans approximately 14,000 years ago and have become closely associated with many human activities, including hunting, guarding and herding. This association between these two species was further strengthened over time in many cultures, with dogs entering dwellings and spending time with humans, as well as acting as a social partner and for companionship (Beck, 2000; Duckler, 2002; Dotson and Hyat, 2008). However, when dogs are not provided with food and shelter by humans as they are supposed to, they will tend to roam.

The uncontrolled presence of dogs with or without an owner is generally recognised to be a significant problem both for humans and animals. They are known or called by different names in many parts of society (Boitani *et al.* , 1995; Hughes and Macdonald, 2013). Free roaming dogs (FRDs) are defined as a family of dogs that stays in one community together and are not confined to a yard or house.

Therefore, Dog Population Management (DPM) needed to be enacted for numerous animal welfare, public health and safety, and economic reasons with the aim of to improve the health and well-being of FRDs, reduce problems that they may

cause and reduce the size or turnover of the population (Massei and Miller, 2013; Taylor *et al.* , 2017). The DPM is a common practice in many countries worldwide now to further combat and permanently solve this matter as this FRD problem has become a global problem (Sternheim, 2012).

The Word Health Organisation (WHO), the World Organisation for Animal Health (OIE), the Food and Agriculture Organisation of the United Nations (FAO) and the Global Alliance for Rabies Control (GARC) have established a global "United Against Rabies" collaboration to provide a common strategy to achieve "zero human rabies deaths by 2030" (Abela-Ridder, 2018). Examples of successful rabies elimination programmes can be witnessed at Latin America and the Caribbean, Bangladesh, Mexico, Philippines, South Africa, Sri Lanka and United Republic of Tanzania (Abela-Ridder, 2018). WHO has also estimated that there are more than 200 million stray dogs worldwide, and the total population of free roaming dogs makes up about 75-85% of the global dog population (WAP, 2013). Every year 69,000 people die from rabies, while another 15 million receive post-exposure treatment to avert the deadly disease. Ninety-five percent of these cases occur in Asia and Africa, and 99% of the fatalities are caused by dogs (WAP, 2013; Bamaiyi, 2015; Menghistu *et al.*, 2018).

In Malaysia, the status quo of our FRDs and its management is inconclusive. This study was initiated after the 2015 rabies outbreak in Penang and concerned many parties that are either involved directly or indirectly in the management of these FRDs. Animal lovers and welfare organisations have been reported to have been involved in the feeding and management of these free roaming dogs in Penang. However, the actual status quo of our FRDs, its management and the involvement of these organisations in the welfare of these animals in terms of controlling population, disease prevention of rabies and treatment is unknown. Hence, this was the pioneer study conducted in the country, in Penang namely.

The culling of FRDs had generated controversy and mass protests by animal lovers and welfare activists around the country, especially in Penang state. The main concerns of the activists were what they perceived as the indiscriminate culling of free roaming dogs instead of mass vaccination of all dogs against rabies (Bamaiyi, 2015). Simultaneously, the Malaysian statistics have also indicated that the latest Sarawak Rabies episode 2018 has 16 human cases, claimed 15 lives and left one survivor (child) with severe neurological complications (MOH, 2018; Navanithakumar *et al.* , 2019).

MATERIALS AND METHOD

This research project was a survey that involved questionnaires. The main categories included the public. Every respondent of this project was required to fill in a consent form to give acknowledgement of involvement. Respondents can either choose to be interviewed or fill in the questionnaires at their convenience (Dorothy *et al.*, 2019).

The questionnaires prepared for public respondents were divided into seven main sections that include the following: (A) Basic Information of Participant, (B) Ownership of Dogs, (C) Free Roaming Dogs, (D) Waste Management, (E) General Thought of

Animal Welfare Issue, (F) General Thoughts of rabies and (G) General Thoughts of Dogs and Awareness of rabies (Dorothy *et al.*, 2019). Non-probability sampling technique was adopted for this survey, specifically the convenience approach, as described by Elfil and Negida (2017). The method was selected due to the specific criteria of targeted respondents, who are the local Penang residences, dog owners, feed FRDs and willingness to participate in the survey (Dorothy *et al.*, 2019).

Study Area

The study was conducted in Penang. There are five districts identified in Penang that are: Northeast Penang District, Southeast Penang District, North Seberang Perai District, South Seberang Perai District and Southwest Penang District.

Analysis

The questionnaires were designed so that responses could be analysed by a Lickert scale. Responses were listed in a scale of strongly agree to strongly disagree. Descriptive statistical analysis for each answer was performed according to the aspects outlined in each question.

The seven main sections as outlined in the questionnaires were further compiled into four main categories that include respondents' demographic and rabies knowledge, awareness and prevention. Results were tabulated and analysed in Microsoft Excel. Descriptive statistics that are obtained are further discussed below.

RESULTS AND DISCUSSION

A total of 200 sampling questionnaires were carried out at the four different locations of the sampling area. Analysis for 157 public respondents that consist of the locals of Penang questionnaire sampling had been accomplished, which brought to a success rate of 78.5%. Statistical analysis has been conducted to identify the status quo of FRDs and its managements, concomitantly with the other details than comes along with them.

Demographic Profile of Respondents

The demographic characteristics of respondents are as shown in Table 1. Based on the results, the data on the gender of respondents showed 61.5% are males and 38.5% females. The highest numbers were respondents above 30 years old with 33.1% and the lowest were respondents less than 20 years old with 6.8%. The numbers of respondents who were pet dog owners were 63.4% compared to 36.6% of non-pet dog owners. Only 34.4% of these respondents fed the FRDs and 65.6% do not do so. Almost 57.3% of the respondents lived in terrace houses followed by 19.7% in other types of residents that include high rise buildings such as condominiums and apartments. The findings also revealed that in 22.7% of the respondents' households there were at least six people.

Table 1: Demographic characteristics of respondents in the study of management of FRDs in Penang*.

Characteristic	Number of Respondents	Percentage (%)
Sex		
Male	88	61.5
Female	55	38.5
Age (Years)		
20 and below	10	6.8
21-30	48	32.4
31-40	49	33.1
41 above	41	27.8
Ownership of dogs		
Yes	92	63.4
No	53	36.6
Volunteer to feed FRDs		
Yes	54	34.4
No	103	65.6
Number in household		
1-2	38	25.3
3-4	47	31.3
5-6	34	22.7
7 and above	31	20.7
Type of residents		
Terrace house	90	57.3
Semi-detached	30	19.1
Bungalow	6	3
Others	31	19.7

* The total number of respondents was 157. The figures in this table omit missing data

Table 2. Respondents response on free roaming dogs issue in their neighbourhood.

FREE ROAMING ANIMALS:		Total (n)	Total (%)
How do you feel about the stray animals in your neighbourhood?	They don't bother me	70	44.6
	I like the idea having animals around that I don't need to take care of	49	31.2
	Negative	38	24.2
How often do stray dogs come to your home?	At least once a month	56	35.7
	Several times a year	45	28.7
	Rarely or never	56	35.7
How do you usually respond to stray animals?	Feed them/try to locate their owner or find them a new home	56	21.9
	Report to local animal welfare group or take to shelter	33	12.9
	Try to ignore and hope they go away	103	40.2
	Try to drive away (shouting at them, throwing rocks, etc.)	38	14.8
	Shoot or poison	7	2.7
	Call Animal Control	3	1.2
	Others	16	6.3
How often do your neighbours' dogs come to your home?	At least once a month	48	30.6
	Several times a year	40	25.5
	Several times a year	69	43.9
How do you usually respond when a neighbour's dog comes by?	Nothing – don't mind them visiting	46	19.6
	Call owner/take them home	63	26.9
	Try to ignore/hope they go away	88	37.6
	Try to drive away (shouting at them, throwing rocks, etc.)	36	15.4
	Shoot or poison	0	0.0
	Call Animal Control	1	0.4
	Others	0	0
Have you ever called Animal Control?	Yes	44	28.0
	No	113	72.0

* The total number of respondents was 157. The figures in this table omit missing data.

Rabies Knowledge, Awareness and Prevention

Rabies knowledge, awareness and prevention were divided into four main parts that consist of (1) knowledge and perception on rabies, (2) animal bite incidents, (3) awareness and knowledge of medical assistance after a dog bite and (4) prevention of rabies.

Knowledge and Perception on Rabies

Respondents were given eight questions in the questionnaire survey to test out their knowledge of rabies and how aware they are of the dangers. Simple questions that included the definition of rabies, whom and how the disease is transmitted, the deadliness and prevention, treatment regime and risk of infection were given to respondents.

Respondents were also given a set of general statements of dogs and rabies as in Table 2 to identify their beliefs. The analysis of these sets of questions indicated that 69.0% of respondents were not knowledgeable about rabies and its zoonotic implications (Figure 4). This survey also revealed that many respondents were not aware of the dangers of this disease as 39.0% of them were not sure if rabies could be treatable or not yet alone the consequences if not treated (45.0% respondents). As for the prevention and risk of infection, 58.0% of respondents were unfamiliar with the precaution steps that should be taken and 52.0% of the respondents were also unaware that they could be at risk of getting infected.

Further analysis from the general statements of rabies and dogs also revealed that 22% of respondents strongly agreed that rabies is a problem in Malaysia even though their understanding and knowledge were poor. Our analysis also revealed that 74% of respondents disagreed that rabies can be prevented by euthanization of FRDs (Figure 2). It was also noted that most of these respondents (70%) agreed that children are at greater risk of contracting rabies rather than adults (Table 3). This statement supports the fact as mentioned by WHO and OIE that 40% of people bitten by suspect rabid animals are children under 15 years of age and children between the ages of 5 to 14 years are frequent victims (WAP, 2013; WHO, 2015).

Animal Bite Incidents

The analysis from survey questions regarding animal bite incidents among respondents had shown us that the ratio of those that had previous bite incidents and have not been bitten before are similar with 52.0% and the latter 48% (Figure 3). Further investigation revealed 49.0% of respondents were bitten by FRDs while 51.0% were bitten by their household dogs, whereas 60.0% of the respondents revealed they were bitten elsewhere than their home or streets and 34.0% were bitten on the streets.

Awareness and Knowledge of Getting Medical Assistance

As for awareness and knowledge of getting medical help, Figure 4 and Figure 5 respectively indicates that 72% were

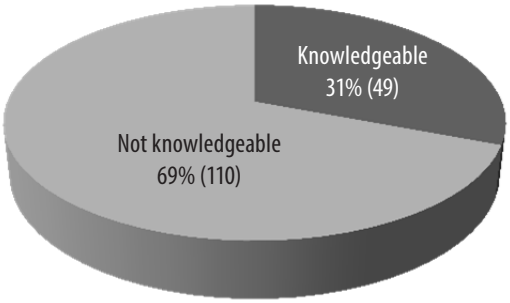

Figure 1. Percentage of respondents' knowledge on Rabies and its zoonotic implications.

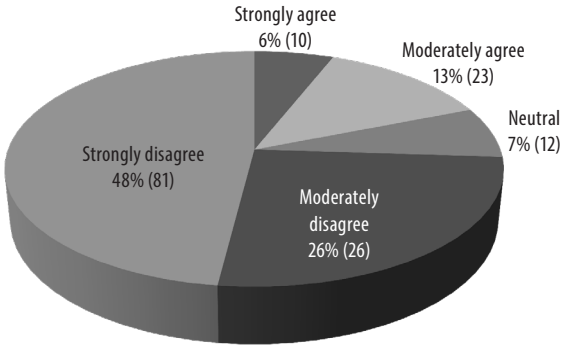

Figure 2. Percentage of respondents' believed for rabies prevention by euthanisation.

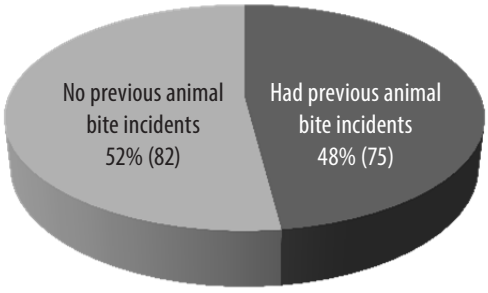

Figure 3. Percentage of respondents' animal bite incidents experience.

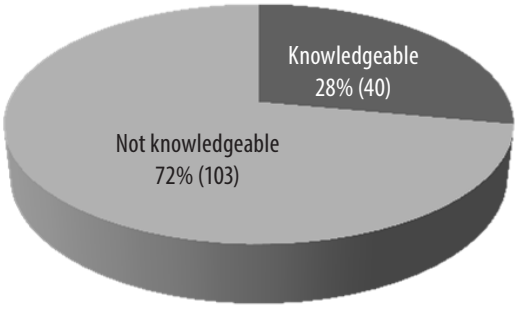

Figure 4. Percentage of respondents' knowledge on treatment options available.

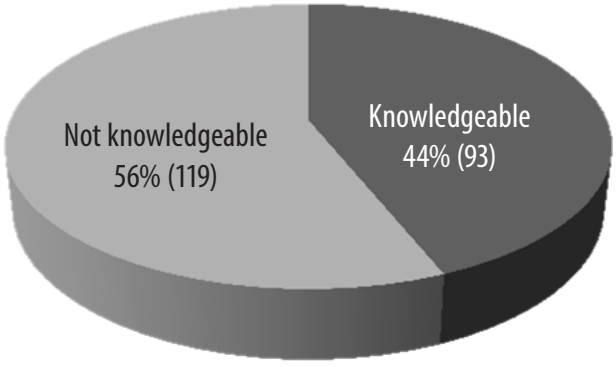

Figure 5. Percentage of respondents' knowledge on post-exposure prophylaxis and first aid after a dog bite.

unfamiliar with the treatment options available in which 56% do not know the next step after a dog bite for post-exposure prophylaxis (PEP) and first-aid of the wounds regardless it is a rabid or non-rabid dog.

Respondents were unaware of the PEP as recommended by WHO, and the OIE that includes extensive washing and local treatment of the wound as soon as possible after exposure, a course of potent and effective rabies vaccine that meets WHO standards and the administration of rabies immunoglobulin (RIG), if indicated, that should be followed if bitten by rabid dogs.

Further interviewing had also indicated that respondents were unaware of the extensive wound washing method that includes immediate and thorough flushing and washing of the wound for a minimum of 15 minutes with soap and water, detergent, povidone iodine or other substances that kill the rabies virus.

Prevention of Rabies

Rabies is a preventable viral disease which occurs in more than 150 countries and territories. (WAP, 2013) Increasing awareness of rabies prevention and control in communities includes vaccination, education and information on responsible pet ownership, how to prevent dog bites, and immediate care measures after a bite.

Eliminating rabies in dogs by vaccination

Table 3 indicates that 66% respondents agreed that rabies can be effectively prevented by vaccinating dogs, as rabies is a vaccine-preventable disease. This is in par with the ideology and stand of WHO, and the OIE which states that vaccinating dogs is the most cost-effective strategy for preventing rabies in people and elimination in dogs. Dog vaccination reduces deaths attributable to rabies and the need for PEP as a part of dog bite patient care (WAP, 2013; WHO, 2015).

Only 24% respondents disagreed with this statement and 11% were neutral about it.

Education on dog behaviour and bite prevention

WHO and OIE have also stated that education on dog behaviour and bite prevention for both children and adults is an essential extension of a rabies vaccination programme and can decrease both the incidence of human rabies and the financial burden of treating dog bites. Increasing awareness of rabies prevention and control in communities includes education and information on responsible pet ownership, how to prevent dog bites, and immediate care measures after a bite. Engagement and ownership of the programme at the community level increases reach and uptake of key messages (WAP, 2013; WHO, 2015).

This statement is also agreed by 84% respondents in this study (Table 3). From this table, 38% respondents strongly agree and 46% moderately agree. Thirteen percent of respondents have neutral opinions of prevention of rabies by education. Education on dog behaviour and its movement is important for bite prevention purposes. Learning and understanding dogs' instinct on its surrounding is important as it will

Table 3. Respondents knowledge and perception on Rabies and dogs in general.

	RESPONDENTS KNOWLEDGE AND PERCEPTION									
	Strongly agree		Moderately Agree		Neutral		Moderately Disagree		Strongly disagree	
GENERAL STATEMENTS ON DOGS AND RABIES	Total (n)	Total (%)	Total (n)	Total (%)	Total (n)	Total (%)	Total (n)	Total (%)	Total (n)	Total (%)
In general, all dogs are dangerous	8	5	14	9	14	9	52	33	69	44
Stray dogs are dangerous	49	31	12	8	22	14	38	24	36	23
Rabies is a problem in Malaysia	48	22	30	18	18	11	34	20	36	22
Rabies is a problem in my area	31	14	25	11	7	3	78	36	78	36
Children are at a greater risk of contracting rabies than adults	70	37	62	33	14	7	13	7	31	16
Rabies can be effectively prevented by vaccinating dogs	45	28	61	38	18	11	18	11	20	13
Rabies can be effectively prevented by euthanizing (killing) stray dogs	10	6	23	13	12	7	44	26	81	48
Rabies can be prevented by educating people about the disease	59	38	71	46	13	8	9	6	3	2

* The total number of respondents was 157. The figures in this table omit missing data.

react to it accordingly as perceived by its brains (WAP, 2013; WHO, 2015). A set of questions were included in the questionnaire survey to determine how respondents will react to different situations involving dogs per say (Table 4). Questions included were respondents' response if dogs were chasing, jumping or barking at them during different activities.

Our analysis revealed that 64% of respondents were not knowledgeable of how to react if they had encountered a dog in the streets generally (Table 4). Our analysis had also revealed that respondents also did not know how to react if dogs run up to them (72%), were chasing (60%), jumping (65%) or barking (66%) at them in various types of scenarios as shown in Table 4.

This clearly shows that education is crucial in terms of awareness of rabies and preventing dog bites. Dogs are the main source of human rabies deaths, contributing

Table 4. Respondents response when dealing with dogs in different situations.

RESPONSE WHEN DEALING WITH DOGS		Total (n)	Total (%)
What do you do if you meet a dog in the street?	Yes	56	36
	No	101	64
You are running or playing and a dog runs up to you. Should you	Stop playing, stand very still and don't shout or scream	43	28
	Keep on playing, chase the dog away and shout at the dog	81	52.3
	Stand still and shout at the dog or scream. Kick the dog if the dog comes close to you	30	19.5
You are riding a bicycle and a dog chases you. Should you	Stop riding and stand still	63	40.2
	Carry on riding away as fast as you can and hope the dog doesn't catch you	71	33.8
	Stand still and shout at the dog or scream. Kick the dog if the dog comes close	41	26.1
A dog jumps at you. Should you	Try to turn your back to the dog and stand still	54	34.4
	Start to run away, shouting at the dog and kicking the dog away	82	33.1
	Stand still and push the dog off you, screaming and shouting	51	32.5
A dog barks at you. Should you	Look at the floor and slowly back away from the dog	53	33.8
	Run up to the dog shouting at the dog to stop making such a noise	75	47.8
	Start to run away screaming and shouting	10	18.5

* The total number of respondents was 157. The figures in this table omit missing data.

up to 99% of all rabies transmissions to humans. The one and only way to do it is to learn, understand and practice what we have learnt on how to recognise and react when playing with a dog or in situations of threat (WAP, 2013; WHO, 2015).

Dogs will normally exhibit their emotions or reactions by body movements and recognising that is very important to prevent dog bites. A dog will only exhibit signs of fear and bite if it feels that it is in danger and being threatened. Incorporating animal welfare, learning and understanding dog behaviour, dos and don'ts when interacting with dogs in children's education of all ages as well as in adults will definitely help (WAP, 2013; WHO, 2015).

Education and information on Responsible Pet Ownership (RDO) will also definitely help in the prevention of rabies and dog bite. Our study has also indicated that FRDs with owners are more compared to FRDs without owners. Hence, all pet owners should know and practice the five freedoms that are in the Responsible Pet

Ownership (RDO) guidelines as outlined by DPM (FAO, 2014; Taylor *et al.* , 2017).

CONCLUSION

In conclusion, the finding in this study indicates that the respondents were very aware of this FRD matter and did want a solution in a proper manner for the benefit of both dogs and people. Therefore, the Government, NGO and the public should lend a helping hand to settle FRDs problem together.

As for the rabies awareness and dog bite prevention, many respondents were found to have poor knowledge with minimal awareness about the disease and how to prevent it. The awareness level of respondents in regards to compulsory medical measures after an immediate dog bite exposure was also inadequate despite not being aware that the dog that could have bitten them could be a rabid dog.

Therefore, the knowledge and awareness of rabies prevention should be increased and include the following: vaccination, education and information on responsible pet ownership, how to prevent dog bites, and immediate care measures after a bite. More effort should be put in to educate people in all walks of life about rabies and its precaution methods, even though children are at greater risk of contracting rabies. Both the Government and NGOs should join hands to educate the public about the dangers and prevention of this preventable disease.

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