Public Awareness Towards Rabies and its Management among Residents from the Origin of Rabies Outbreak, Serian Division of Sarawak

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ABSTRACT

Introduction:
This study explored public awareness of rabies and its management among the residents at the origin of the rabies outbreak in Serian division of Sarawak.

Methods:
This cross-sectional survey was conducted between April and June 2022 at Serian Hospital's Outpatient Pharmacy Department. Patients visiting during this period were invited to participate. The questionnaire was developed based on a thorough literature review and expert opinions, and it was pre-tested for clarity and cultural appropriateness after translation into Malay and Mandarin. All questions were designed to be unidimensional, and descriptive statistics were employed to analyze and report the findings.

Results:
A total of 390 respondents were included in the analysis. The majority were female (55.9%), aged 40-49 years (32.1%), identified as Bidayuh (56.2%), owned dogs or cats (56.9%), and had attained at least a secondary education (76.4%). Most respondents obtained information about rabies from the media (60.5%). Almost all respondents (95.6%) had heard of rabies, and 90.3% were aware of its potentially fatal consequences. However, only 22.3% knew that rabies in humans cannot be cured once symptoms appear. Among the respondents who owned dogs or cats (n=222, 56.9%), a significant proportion (51.4%) reported never vaccinating their pets. Of those who did vaccinate (n = 108), only 55.6% (n = 60) had their pets vaccinated within the past 12 months. Regarding local wound management, 76.2% knew that immediate washing of the wound site with running water is essential.

Conclusion:
This pioneering study in Malaysia assesses awareness of rabies and its management among residents in an area affected by a recent outbreak. It underscores significant knowledge gaps that healthcare authorities and practitioners must promptly address through tailored and effective health communication strategies.

Keywords:
Awareness, health campaign, rabies, Sarawak

INTRODUCTION

Rabies causes an estimated 59,000 human deaths annually, with 95% occurring in Africa and Asia.[1] In Southeast Asia, where rabies is endemic, the Association of Southeast Asian Nations (ASEAN) launched an elimination strategy in 2015 aimed at eradicating human rabies from the region by 2020. Malaysia, an ASEAN member, successfully eliminated canine rabies in 1999, with the last human case reported in 1998. The ASEAN strategy prioritized maintaining Malaysia's rabies-free status.[2] Peninsular Malaysia further the initiatives by conducting annual dog licensing, annual rabies vaccination program, animal movement control in immune belt, management of dog bite cases, and national surveillance program.[3] However, these measures have not been consistently applied in Sarawak, since it has been historically free of the disease. Routine rabies vaccination were not conducted and surveillance of rabies in dogs at Sarawak-Indonesia borders has stopped in 2015.[4,5] In July 2017, Malaysia reported its first human rabies case in the Serian division of Sarawak, linked to freely roaming dogs from Kalimantan, Indonesia at the border area. Phylogenetic analysis confirmed this as the source of the outbreak. To date, Sarawak has reported 66 human cases, resulting in 59 fatalities and one survivor with severe neurological complications.[6]

In 2023, Sarawak faced the seventh year of a persistent rabies outbreak, with all divisions declared as infected zones.[8] Since the initial outbreak in 2017, extensive measures have been implemented to contain the spread of the disease. Mass vaccination campaigns for animals commenced immediately following the first outbreak and have continued annually, resulting in the vaccination of 230,000 dogs by the Department of Veterinary Services Sarawak.[6] In addition to vaccination efforts, proactive measures such as dog population management, rigorous surveillance of rabies in animals, and comprehensive public awareness campaigns have been diligently pursued by authorities.[9] Legislative measures, including the enforcement of the Local Authorities (Dog Licensing and Control) By-laws 2018 since December 2018, have also been pivotal in mitigating rabies transmission risks.[10] Despite these concerted efforts, the incidence of human rabies cases showed an unfortunate increase in 2023.

From January to May 2023, nine deaths were reported, compared to ten deaths from January to December 2022.[11] The most recent fatality due to rabies occurred in May 2023. Additionally, the prevalence of infected animals remains a concern, with 23.2% of cats and dogs testing positive for rabies during surveillance in the same period, according to the Department of Veterinary Services Sarawak. Moreover, combating rabies is complicated by a significant number of reported animal bites, averaging around 250 cases per month.[11]

In Malaysia, little has been done to explore the awareness of rabies and its management. However, a singular study conducted in 2016 in Kluang, Johor, investigated knowledge, attitude and practice on bat-borne diseases including rabies.[12] The current study aims to assess public awareness of rabies, specifically regarding signs and symptoms of rabies in humans and dogs, mode of transmission and management of dog or animal bites among the residents in the origin of the rabies outbreak, Serian Division of Sarawak. The findings would be useful to provide insights to health authorities in formulating effective strategies to curb the rabies outbreak.

METHODS

This cross-sectional survey study was conducted from April 2022 to June 2022 at Serian Hospital, Sarawak. Prior to data collection, the study received approval from the Medical Research Ethics Committee, Ministry of Health, Malaysia (NMRR ID-21-1198-59390(IIR)), dated March 29, 2022.

The study population comprised residents of Serian Division, which has an estimated population of approximately 154,790 according to the official website of Serian District Council.[13] A sample size of 383 was determined assuming an expected awareness proportion of 50%, with a 95% confidence interval and 5% absolute precision.[14] Convenience sampling was employed by inviting patients attending the outpatient pharmacy department of Serian Hospital during the study period to participate, provided they were above 18 years old and residing in Serian Division. Exclusions included individuals unable to read or speak Bahasa Malaysia, English, or Chinese, those unable to think logically, and those who did not consent.

The questionnaire consisted of three sections: socio-demographic characteristics, awareness of rabies, and awareness of rabies management, totaling 30 questions and requiring approximately 15 minutes to complete. It was initially developed in English, translated into Malay and Chinese, and then back-translated into English by different translators. Forward and backward translations were reconciled by two experienced pharmacists, with pre-testing conducted among 12 respondents (4 per language) to ensure clarity and cultural appropriateness.[15,16] Adjustments were made on the questionnaire and the adjusted version was retested. Notably, all questions were unidimensional so no reliability test was needed.

Following adjustments based on the pre-test feedback, the finalized questionnaire was printed for distribution among respondents who were waiting to collect medications at the Outpatient Pharmacy Department of Serian Hospital. Those who fulfilled the inclusion and exclusion criteria and provided consents were included in the study. Respondents were briefed about the study using a participant information sheet and asked to provide written consent before participating. Each respondent was assigned a unique ID for data collection and analysis. Data preparation, including editing, coding, and entry using Microsoft Excel, was performed by one researcher, with verification of accuracy by another researcher. Missing data were not imputed. Statistical Package for the Social Sciences (SPSS) version 22 was used for data cleaning and analysis, with descriptive statistics used to summarize findings due to the unidimensional nature of the questionnaire items.

RESULTS

A total of 390 respondents were included in the analysis. The majority of them were female (55.9%), aged 40-49 years (32.1%), were Bidayuh (56.2%), were dog/cat owners (56.9%), had at least secondary education (87.4%.), were employed (62.8%), and had children less than 12 years old at home (51.0%) (Table 1). Among the dog/cat owners (n=222), most never vaccinated their dog/cat (n = 114, 51.4%). Among those who vaccinated their pets (n = 108), only 55.6% of them (n = 60) had their pets vaccinated within the past 12 months.

Table 1. Demograhic Characteristics (n=390)

Characteristics	Category	n (%)
Age group (years)	18-29	77 (19.7)
	30-39	87 (22.3)
	40-49	125 (32.1)
	50-59	70 (17.9)
	60 and above	23 (5.9)
	Missing	8 (2.1)
Gender	Male	172 (44.1)
	Female	218 (55.9)
Race	Iban	65 (16.7)
	Malay	62 (15.9)
	Bidayuh	219 (56.2)
	Chinese	40 (10.3)
	Others	4 (1.0)
Education	No formal education	16 (4.1)
	Primary	33 (8.5)
	Secondary	249 (63.8)
	College/ University	92 (23.6)
Occupation	Unemployed	140 (35.9)
	Employed	245 (62.8)
	Missing	5 (1.3)
Children (<12 years old) at home	Yes	199 (51.0)
	No	191 (49.0)
Dog/Cat Owner	Yes	222 (56.9)
	No	168 (43.1)

Awareness on rabies

Table 2 summarises the findings on the awareness of rabies among the respondents. A large majority of respondents (95.6%) were familiar with rabies, and 90.3% knew that it can be fatal. Most respondents (66.2%) correctly identified the virus as the cause of rabies, while 52.6% knew that humans and various domestic animals can contract the disease. Awareness was high regarding transmission through animal bites (94.1%), but fewer knew about transmission via scratching (59.7%) or contact between rabid animal saliva and open wounds (47.9%).

Regarding the severity of rabies based on bite sites, the majority (68.7%) were unaware that bites to the head and neck are particularly dangerous due to the rapid travel of the virus to the brain.

Common signs of rabid animals recognized by respondents included aggressiveness (76.4%), hypersalivation (63.6%), and unprovoked biting (55.1%). Awareness of human symptoms was notable for hydrophobia (47.9%).

Meanwhile, a majority (73.1%) knew that suspected rabies cases can be confirmed through laboratory tests. Significantly, only 22.3% were aware that rabies in humans becomes incurable once signs and symptoms appear. Notably, a majority (85.6%) knew that rabies is preventable by routine vaccination.

A vast majority of respondents (84.1%) were aware of the government's anti-rabies vaccination program. Information about rabies was mainly obtained from the media (60.5%), friends and family (42.1%), and vaccination campaigns (41.0%).

Table 2. Awareness on rabies (n=390)

Awareness on Rabies	n (%)
Have you heard of rabies previously?	
Yes	373 (95.6)
No	17 (4.4)
Will rabies cause death?	
Yes	352 (90.3)
No	6 (1.5)
Not sure	32 (8.2)
What causes rabies?	
Virus	258 (66.2)
Bacteria	82 (21.5)
Not sure	48 (12.3)
Missing	2 (0.5)
What are the species affected by rabies?	
Dog only	139 (35.6)
Human only	6 (1.5)
Human and all mammals (dog, cat, bat, cattle, sheep, goats)	205 (52.6)
Not sure	40 (10.3)
How does rabies spread? (multiple answers)	
Animal bite	367 (94.1)
Animal scratch	233 (59.7)
Animal licking of open wound	187 (47.9)
Animal faeces/urine	73 (18.7)
Air-borne	20 (5.1)
Human contact	48 (12.3)
Not sure	22 (5.6)
If you are bitten by a rabid animal, which one of the following bite sites will cause one to develop signs and symptoms of rabies most rapidly?	
Head and neck	122 (31.3)
Upper part of body	36 (9.2)
Lower part of body	68 (17.4)
Not sure	164 (42.1)
What are the signs and symptoms of a rabid animal? (multiple answers)	
Aggressiveness	298 (76.4)
Biting without provocation	215 (55.1)
Foaming at mouth / Hypersalivation	248 (63.6)
	92 (23.6)
Changes in sound	78 (20.0)
Eating abnormal items	46 (11.8)
Not sure	

Table 2. continued

Awareness on Rabies	n (%)
What are the signs and symptoms of a human with rabies? (multiple answers)	
Hydrophobia	187 (47.9)
Confused	152 (39.0)
Agitation	174 (44.6)
Difficulty swallowing	104 (26.7)
Not sure	125 (32.1)
Can suspected rabies be confirmed by laboratory tests?	
Yes	285 (73.1)
No	16 (4.1)
Not sure	89 (22.8)
Can rabies in human be cured after signs and symptoms appear?	
Yes	147 (37.7)
No	87 (22.3)
Not sure	156 (40.0)
Is rabies preventable by routine vaccination of pet dogs/cats?	
Yes	334 (85.6)
No	6 (1.5)
Not sure	50 (12.8)
Are you aware of the government's anti rabies vaccination program?	
Yes	328 (84.1)
No	62 (15.9)
How did you know about the government's anti rabies vaccination program? (multiple answers)	
Friends/family	164 (42.1)
Health officials	145 (37.2)
School	71 (18.2)
Workplace	84 (21.5)
Vaccination campaign	160 (41.0)
Media	236 (60.5)
Poster/Leaflet	129 (33.1)
Newspaper	88 (22.6)

Awareness on rabies management

Table 3 presents the findings regarding awareness of rabies management. Notably, 71 (18.2%) respondents reported that either themselves or a family member had been bitten by a dog or cat. Among them, 33 (46.5%) were bitten by wild dogs or cats, while others were bitten by their own pets.

In terms of post-bite management, most respondents (64.6%) indicated they would cage and observe the animal's condition, while 12.3% would do nothing to the animal. On local wound management, only 76.2% knew to wash the wound site immediately with running water, and worryingly, 16.9% would do nothing. The majority of respondents (93.8%) stated they would seek treatment promptly after exposure.

However, only half (53.6%) knew that their pets should be vaccinated annually to maintain vaccine efficacy.

Awareness on rabies and its management among dog/cat owners

We focused on the awareness of rabies and its management among 222 dog/cat owners, finding that 11 (5.0%) of them had never heard of rabies. While awareness of preventing rabies through routine vaccination was high (86.5%), a concerning 51.4% of dog/cat owners admitted to never vaccinating their pets against rabies, and 21.6% vaccinated them irregularly, with intervals exceeding 12 months. Knowledge regarding signs of rabies in animals was limited; while aggressiveness (76.4%) was commonly recognized, other signs such as biting without provocation (55.1%) and foaming at the mouth or hypersalivation (63.6%) were unfamiliar to most respondents. Furthermore, 11.3% of dog/cat owners were unsure about common signs of rabies. (Appendix A, Table 2)

Knowledge gaps were also evident in understanding transmission methods beyond bites, especially concerning animals licking open wounds. While the majority recognized that rabies can be fatal, it was concerning that some believed otherwise. Notably, one respondent who had been bitten by a wild dog or cat claimed to have never heard of rabies. (Appendix A, Table 4)

Regarding post-bite management, the majority of respondents who had been bitten sought treatment immediately. Most dog/cat owners who had been bitten by their own pets washed their wounds with water and soap as a first response (92.1%), although this percentage was lower among those bitten by wild dogs or cats (57.6%). A majority of dog/cat owners also indicated they would cage and observe an attacking animal, though a small minority (15.8%) considered killing the pet. Additionally, half (45.5%) of those bitten by wild dogs or cats would take no action against the attacking animal. (Appendix A, Table 5).

Table 3: Awareness on rabies management (n=390)

Awareness on rabies management	n (%)
Has you or anyone in your family ever been bitten by a dog or cat?	
Bitten by own pets	38 (9.7)
Bitten by wild dog/cat	33 (8.5)
Never	319 (81.8)
If an animal were to bite you or your family, what would you do with it?	
Kill	90 (23.1)
Cage and observe	252 (64.6)
Do nothing	48 (12.3)
What is the first thing that you would do immediately following a bite by dog/cat?	
Wash with soap/water	297 (76.2)
Apply topical medicines	17 (4.4)
Seek for traditional treatment	0 (0.0)
Go to clinic/hospital	4 (1.0)
Do nothing	66 (16.9)
Do not know	2 (0.5)
Missing	4 (1.0)
How soon would you seek treatment following a bite by dog/cat?	
Immediately	366 (93.8)
Within a week	19 (4.9)
More than a week	4 (1.0)
Would not seek treatment	1 (0.3)
How frequent should you vaccinate your pet with rabies vaccine?	
Monthly	76 (19.5)
Yearly	209 (53.6)
Once in a lifetime	46 (11.8)
When necessary	59 (15.1)

DISCUSSION

Public awareness about rabies and its management is crucial for controlling its spread within communities. Since 2017, Sarawak has conducted 3790 rabies awareness campaigns, significantly impacting awareness levels.[9] In our study, a vast majority of respondents (95.6%) had heard of rabies, contrasting with lower awareness rates reported in other countries such as Nigeria (38%),[17] Congo (52%)[18], and India (60.4%)[19]. This heightened awareness in Serian can be attributed to media channels (60.5%) and government campaigns (41.0%). Notably, Sarawak residents relied mostly on media channels such as television (urban population) and radio (rural population) to obtain drug-related health information.[20]

Rabies is a highly fatal disease, with a survival rate of only 4.0% in Malaysia[21], yet in our study, 90.3% of respondents understood its deadly nature, similar to findings from Morocco (89.2%).[22] According to the health belief model,[23] accurate perceptions of rabies severity prompt timely actions like pet vaccination, yet only half of our respondents were aware that animal scratches (59.7%) or animals licking open wounds (47.9%) can transmit the virus. This is slightly higher compared to studies done in Kwara State, Nigeria (10.0%)[17], but lower than the study done in Congo (88.0%)[18].

Despite recognizing the importance of vaccination in preventing rabies transmission, many pet owners fail to vaccinate regularly, jeopardizing efforts for a rabies-free nation.[24] A study conducted in Sarawak previously has revealed that to achieve rabies-free status, at least 50% or more dogs need to be vaccinated.[24] Therefore, to achieve rabies-free status, rabies vaccination rates have to be improved.

The importance of cleaning wounds under running water with soap is emphasized in WHO Rabies Management as a critical step in rabies post-exposure prophylaxis (PEP).[25] However, awareness of this guideline remains low among respondents, with only 76.2% recognizing the necessity of washing the wound for 15 minutes following bites or scratches from dogs or cats. In countries like India Congo (2%),[18] (22.9%),[19] and Morocco (56%),[22] awareness levels of this essential PEP step are similarly deficient. Thus, enhancing awareness of rabies PEP is crucial as it directly correlates with reducing mortality rates (WHO Rabies Management.[25]

With increased awareness of rabies and its management, healthcare authorities and stakeholders can boost pet vaccination rates, minimize encounters with rabid animals to reduce animal bites, lower rabies mortality rates, decrease the healthcare burden associated with rabies, and ultimately work towards achieving a rabies-free environment. The One Health Approach is recognized as pivotal to this success.[25-28] The Veterinary Department has implemented significant preventive measures such as establishing immune belt areas through vaccination, managing stray dog populations, enhancing public awareness through education campaigns, and implementing strict animal movement controls, all of which have effectively curbed the spread of rabies.[21] Collaboration between veterinary and public health sectors, spanning governmental and non-governmental organizations, is crucial for raising public awareness about rabies. The Ministry of Education could further contribute by integrating rabies education into school curricula using innovative teaching methods.[29] Achieving rabies-free status requires coordinated efforts across all sectors, including government bodies, non-governmental organizations, and the general public.

Limitations and Recommendations

While this study effectively identified knowledge gaps within the community and assisted healthcare professionals in tailoring educational messages, several limitations should be noted. Firstly, it was conducted at a single center, potentially limiting its applicability to broader populations. Secondly, the questionnaire used to gauge awareness of rabies and its management may not have been sufficiently validated. Lastly, the study's respondents were exclusively patients seeking treatment at Serian Hospital during the study period, which may not fully represent the entire Serian division population. Future research should involve larger and more diverse populations from various regions of Malaysia to enhance the study's generalizability.

CONCLUSION

This study represents the first assessment on awareness regarding rabies and its management among residents in an area affected by a rabies outbreak in Malaysia. The findings underscore significant knowledge gaps that healthcare authorities and practitioners must promptly address through targeted and effective health communication strategies.

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CONFLICT OF INTEREST

The authors declare no conflict of interests.

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ETHICAL APPROVAL

This research project was registered in the National Medical Research Registry (NMRR ID-21-1198-59390) and approved by the Medical Research and Ethics Committee, Ministry of Health Malaysia.

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APPENDIX A

Table 1. Awareness on rabies in human after signs and symptoms appear according to education level (n=390)

Education Level	Can rabies in human be cured after signs and symptoms appear?, n (%)		
	Yes	No	Not sure
No formal education and primary school	19 (38.8%)	12 (24.5%)	18 (36.7%)
Secondary school above	128 (37.5%)	75 (22%)	138 (40.5%)

Table 2. Awareness on rabies among dog/cat owners (n=222)

Awareness on Rabies among Dog/Cat Owners	Yes, n(%)	No, n(%)
Have you heard of rabies previously?	211 (95.0%)	11(5.0%)
What are the sign & symptoms of a rabid animal? (multiple answers)		
Aggressiveness	180 (81.1%)	42 (18.9%)
Biting without provocation	127 (57.2%)	95 (42.8%)
Foaming at the mouth/Hypersalivation	143 (64.4%)	79 (35.6%)
Not Sure	25 (11.3%)	197 (88.7%)
Is rabies preventable by routine vaccination of pet dogs/cats?	192 (86.5%)	30 (13.5%)

Table 3. Pet vaccination history among dog/cat owners (n=222)

Pet Vaccination History among Dog/Cat Owners	Within the past 12 months, n(%)	More than 12 months ago, n(%)	Never, n(%)
When did you last vaccinate your pet with rabies vaccine?	60 (27%)	48 (21.6%)	114 (51.4%)

Table 4. Awareness on rabies among respondents with history of dog/cat bite (n=71)

Awareness on Rabies among Respondents with History of Bite	History of bite by own pet dog/cat, (n=38)	History of bite by wild dog/cat, (n=33)
Have you heard of rabies previously?		
Yes	38 (100.0)	32 (97.0)
No	0 (0.0)	1 (3.0)
Will rabies cause death?		
Yes	33 (86.8)	31 (93.9)
No	2 (5.3)	2 (6.1)
Not sure	3 (7.9)	0 (0.0)
How does rabies spread? (multiple answers)		
Animal bite	36 (94.7)	29 (87.9)
Animal scratch	28 (73.7)	21 (63.6)
Animal licking of open wound	17 (44.7)	19 (57.6)

Table 5. Awareness on rabies management among respondents associated with history of dog/cat bite (n=71)

Awareness on Rabies Management among Respondents associated with History of Dog/Cat Bite	History of bite by own pet dog/cat, (n=38)	History of bite by wild dog/cat, (n=33)
If an animal were to bite you or your family, what would you do with it?		
Kill	6 (15.8)	4 (12.1)
Cage and observe its condition	28 (73.7)	14 (42.4)
Do nothing	4 (10.5)	15 (45.5)
Is washing with soap and water the first thing that you would do immediately following a bite by dog/cat?		
Yes	35 (92.1)	19 (57.6)
No	3 (7.9)	14 (42.4)
How soon would you seek treatment following a bite by dog/cat?		
Immediately	36 (94.7)	33 (100)
Within a week	2 (5.3)	0 (0.0)
More than a week	0 (0.0)	0 (0.0)
Would not seek treatment	0 (0.0)	0 (0.0)