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Investigation on a Dog Rabies Case and Rabid Dog Meat Consumption, Nakhon Phanom Province, Thailand, 2011

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Abstract

In March 2011, public fear on health risk of rabid dog meat consumption was emerged in Nakhon Phanom Province. Investigation was conducted to identify extent of exposure and recommendation for rabies prevention. We surveyed in affected villages to find out rabies cases and exposed contacts among dogs, cats and humans. Persons who had contacted with the rabid dog, its carcass or meat were interviewed about their contacts, knowledge, attitudes and practices (KAP) towards rabies. The survey revealed that three owned dogs had been bitten by the rabid dog and 58 persons contacted it. Among the contact persons, 11.3% (bitten by the rabid dog, contact with carcass or saliva, butchered or cooked) and 19.0% (contacted dogs bitten by the rabid dog) fit in the WHO criteria as exposed and possible exposed persons respectively. Thirty two persons who ate well cooked meat of the rabid dog were classified as non-exposed persons. One third of the contact persons did not know about rabies. Persons who ate rabid dog meat had less knowledge on rabies reservoir and transmission compared with those did not eat (P-value <0.05). Contact persons and dogs were provided with post-exposure vaccination; none of them developed rabies. Several types of exposure, except ingesting well cooked meat, posed risk of rabies and local public should be educated about these for better personal protective practices.

Keywords: rabies, dog, dog meat consumption, KAP, Nakhon Phanom

Introduction

Rabies is a fatal infectious disease transmitted from animals to humans. It is caused by rabies virus while dogs are the major reservoirs.[1] Since the principle route of rabies transmission is through saliva, most human rabies is infected by dog bites, scratch or lick on the broken skin. However, human cases due to contact with infectious saliva or neurological tissues through mucous membranes are rarely occurred. There were reports of rabies transmission from ingestion in experimental setting and anecdotal viral transmission to a lamb and a human infant by milk.[2] Human rabies caused by eating dog meat has been reported in Vietnam.[3] The National Association of State Public Health Veterinarians (NASPHV) recommends against consuming tissues and milk from rabid animals.[1]

Rabies is still endemic in Thailand with annual reported cases of 10-20 in humans and 200-300 in animals. Dog meat is regarded as a traditional cuisine in some areas of Thailand. The meat is butchered and sold locally without any inspection, which may pose risk of rabies transmission to people consuming dog meat. Risk behaviors, knowledge, attitude and practices (KAP) towards rabies among the risk groups should be explored to identify recommendations for rabies prevention that fit in the local context. In March 2011, public fear on rabies from dog meat consumption was emerged in Nakhon Phanom Province. Some people in Village 5, Nathon Sub-district, That Phanom District, Nakhon Phanom Province had consumed dog meat served in a funeral ceremony. Brain specimen of that dog was subsequently tested positive for rabies. Thus, an investigation team conducted survey in the affected

villages to identify extent of exposure and provide recommendations for rabies prevention.

Methods

Active Case Finding in Dogs and Cats

A survey was conducted in March 2011 to identify rabies contacts and cases in dogs and cats. The survey was focused on Village 5 where the laboratory confirmed rabid dog was found. We interviewed owners of dogs and cats whether their pets have received rabies vaccination during previous 12 months, were bitten by the rabid dog and exhibited particular signs and symptoms, and also whether they observed any stray dog in the village. Owned dogs and cats were defined as suspected or confirmed cases based on the criteria developed by Tepsumethanon V and et al.[4]

A suspected rabid case was a dog or a cat in Village 5 that was reported to die or get lost by the owner within 10 days after the onset of illness and had at least one of the following signs or symptoms during 1 Jan to 23 Mar 2011: aggression, running without apparent reason, stiff walk, scratching mouth, drooped jaw and salivation, depression, laying in a dark place, could not swallow water or food, or vomiting. A confirmed rabid case was a suspected case that was tested positive for rabies by Indirect Fluorescence Antibody (IFA) test from brain specimen.

Environmental Study

Environment of the village was observed to identify the population and habitat of stray dogs. Villagers were asked to locate dog meat shops and explain the cooking procedures of dog meat.

Investigation on Human Exposure to Rabies

The contact person was the one who had contacted with the rabid dog, its carcass, its victim, rabid dog meat or cooking utensils. We interviewed those contacts about demographic characteristics, type of exposure, medications and personal protective practices. Human rabies exposure was identified based on the criteria developed by the World Health Organization.[5]

A possible exposed person was a person who had close contact with secretion from a rabies suspected animal. A probable exposed person was a person who had close contact (was bitten or scratched, killed or dissected) with an animal displaying clinical signs consistent with rabies. An exposed person was a person who had close contact (as described in probable exposure) with an animal that was laboratory confirmed to have rabies.

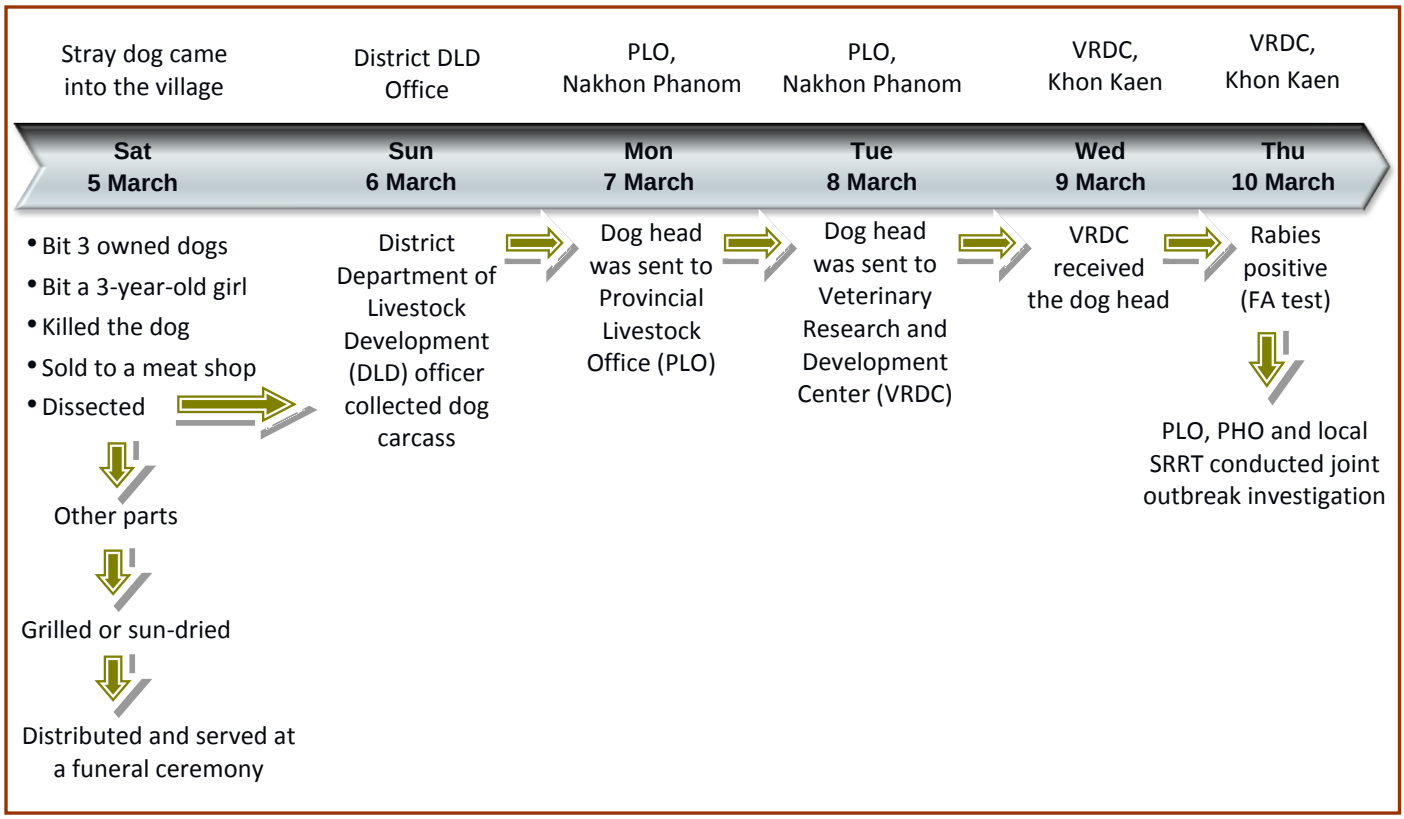

Figure 1. Chronology of events relating to the rabid dog in Village 5, Nathon Sub-district, That Phanom District, Nakhon Phanom Province, 5-10 Mar 2011

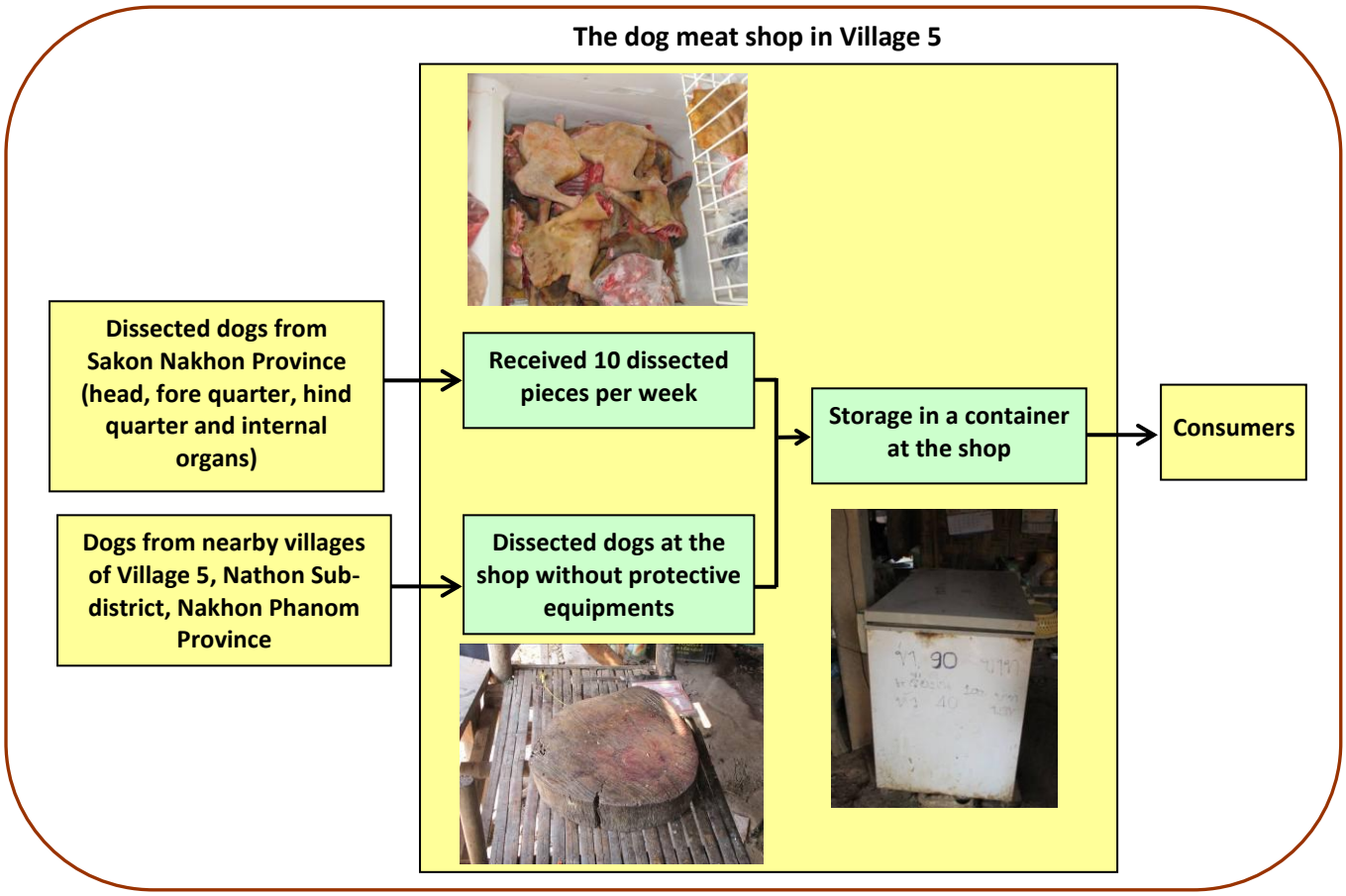

Figure 2. Pathway demonstrating sources, processing and storage in the dog meat shop in Village 5, Nathon Sub-district, That Phanom District, Nakhon Phanom Province, March 2011

Knowledge, Attitudes and Practices (KAP) Survey towards Rabies

We interviewed all contacts with a questionnaire, including information on demography, knowledge about rabies, meat consumption behavior, personal protective practices and rabies prevention practices.[6]

Descriptive statistics and chi-square test were employed for data analysis using Epi Info software (US CDC).[7]

Results

Active Case Finding in Dogs and Cats

Sixty one owned dogs and cats were identified in 35 of 85 households in Village 5. Medians of dogs and cats in each household were 1 and 2 respectively. None of the owned dogs and cats met rabies case definition. The owners reported that 64% of owned dogs and cats had been vaccinated before. As three owned dogs were bitten by the rabid dog, they were revaccinated and quarantined for 45 days. The villagers reported no other stray dog in the village.

The rabid dog was a stray dog while its origin could not be identified. It appeared in the village on 5 Mar 2011 and bit three owned dogs and a 3-year-old girl in the village before it was killed and sold to a local meat shop. Its head was collected by local Department of Livestock Development (DLD) officer and sent to the Veterinary Research and Development Center (VRDC) in Khon Kaen Province for rabies testing as the dog had suspicious signs of rabies. The head was tested rabies positive by Fluorescent Antibody (FA) Test on 10 Mar 2011 (Figure 1).

Environmental Study

No stray dog was seen in the affected village during the survey. There was one dog meat shop in Nathon Sub-district. Dog meats sold in the shop were from dogs butchered in the village or dissected dogs imported from other villages (Figure 2).

The seller did not wear gloves or apron while preparing and selling the meat. All interviewed villagers confirmed that dog meat was cooked well before serving. After slices of dog meat were grilled or sun-dried for 3-4 days, the slides were fried or mixed with herbs, spiced in a bucket and kept for five hours before steaming.

Investigation on Human Exposure to Rabies

Human exposed persons were identified by interviewing 58 contact persons in Villages 1, 2, 5, 6 and 12 of Nathon Sub-district. Contact persons were identified as exposed (10.3%), possible exposed (19.0%) and non-exposed (70.7%) respectively (Table 1).

Table 1. Type of exposure with the rabid dog based on WHO classification criteria, Nathon Sub-district, That Phanom District, Nakhon Phanom Province, March 2011 (n=58)

Type of exposure	Number of people	Percent	Classification of exposure
Bitten by the rabid dog	1	1.7	Exposed
Direct contact with the rabid dog carcass	1	1.7	Exposed
Direct contact with the rabid dog saliva	1	1.7	Exposed
Butchered the rabid dog carcass	2	3.4	Exposed
Cooked the rabid dog meat	1	1.7	Exposed
Ate the rabid dog meat	32	55.2	Non-exposed
Contacted person bitten by the rabid dog	3	5.2	Non-exposed
Contacted dog bitten by the rabid dog	11	19.0	Possible exposed
Submitted specimens	2	3.4	Non-exposed
Cleaned cooking utensils	4	6.9	Non-exposed
Total	58	100	

Table 2. Comparison of knowledge between contact persons who ate and did not eat rabid dog meat, Nathon Sub-district, That Phanom District, Nakhon Phanom Province, March 2011 (n=51)

Knowledge	Total (n=51)		Ate (n=28)		Did not eat (n=23)		P-value
	Number	Percent	Number	Percent	Number	Percent	
Know what rabies is							
Yes	33	64.7	18	64.3	15	65.2	0.94
No	18	35.3	10	35.7	8	34.8	
Know the main reservoir of rabies in Thailand							
Yes	30	63.8	11	44.0	19	83.4	0.01
No	17	36.2	14	56.0	3	16.6	
Know source of rabies information							
Yes	47	92.2	25	89.3	22	95.7	0.62
No	4	7.8	3	10.7	1	4.3	
Know that consuming well cooked meat cannot transmit rabies							
Yes	33	64.7	20	71.4	13	56.5	0.27
No	18	35.3	8	28.6	10	43.5	
Know that consuming raw rabid meat may transmit rabies							
Yes	43	84.3	21	75.0	22	95.7	0.04
No	8	15.7	7	25.0	1	4.3	
Know to send suspected rabid animal to laboratory for confirmation							
Yes	45	88.2	25	89.3	20	87.0	1.00
No	6	11.8	3	10.7	3	13.0	
Know that rabies patients will die							
Yes	41	80.4	23	82.1	18	78.3	0.73
No	10	18.6	5	17.9	5	21.7	
Know that rabies could be prevented by vaccination							
Yes	47	92.2	25	89.3	22	95.7	0.62
No	4	7.8	3	10.7	1	4.3	
Know the places to get vaccination							
Yes	44	86.3	23	82.1	21	91.3	0.67
No	6	11.8	4	14.3	2	8.7	

Table 3. Comparison of attitudes and practices between contact persons who ate and did not eat rabid dog meat, Nathon Sub-district, That Phanom District, Nakhon Phanom Province, March 2011 (n=51)

Attitudes and practices	Total (n=51)		Ate (n=28)		Did not eat (n=23)		P-value
	Number	Percent	Number	Percent	Number	Percent	
Inform authorities if bitten by rabid dog or cat, or found them							
Yes	47	92.2	24	85.7	23	100	0.12
No	4	7.8	4	14.4	0	0	
Seek for treatment if bitten by dog							
Yes	47	92.2	26	92.9	21	91.3	1.00
No	4	7.8	2	7.1	2	8.7	
Destroy rabid owned animals							
Yes	31	60.8	20	71.4	11	47.8	0.08
No	20	39.2	8	28.6	12	52.2	
Destroy rabid unowned animals							
Yes	36	70.6	22	78.6	14	60.9	0.17
No	15	29.4	6	21.4	9	39.1	
Send suspected rabid animal to laboratory for confirmation							
Yes	43	84.3	24	85.7	19	82.6	0.76
No	8	15.7	4	14.3	4	17.4	

KAP towards Rabies in Contact Persons

We interviewed 51 of 58 contacts to assess their knowledge, attitudes and practices towards rabies. Median age was 44 years old, with the range of 10-73 years. Among them, 69% were male, 77% owned dogs or cats, and 51% graduated primary school.

One third of the contacts (35.3%) did not know about rabies. Persons who ate the rabid dog meat had less knowledge on main reservoir of rabies in Thailand and transmission of rabies through consumption of rabid meat compared with those who did not eat (P-value <0.05) (Table 2).

Most of the contacts would inform authorities if they were bitten or found rabid dogs or cats, seek for treatment if bitten by dog and send rabies suspected dog for laboratory testing. Contact persons who ate the rabid dog meat were more willing to kill rabid dog than those who did not eat (Table 3).

Discussion

This study investigated a dog case of rabies, in which many people were involved from preparing and eating the rabid dog meat. Only one person was a true victim who was bitten by the rabid dog. The rest contacted accidentally with ignorance and lack of personal protective practices. Types of exposure included bitten by the rabid dog, direct contact with carcass or saliva of the rabid dog, or contact with dogs bitten by the rabid dog. Ingestion of rabid dog meat can be risky if the meat was not cooked well before serving. In Vietnam, there was a report of two laboratory confirmed rabies cases who developed rabies after butchering, preparing and consuming a dog and a cat.[3] Rabies virus is killed at 50°C, or by sunlight and common chemicals in soap.[2] In communities where dog or cat meat is a traditional cuisine and rabies is also endemic, risk of rabies transmission from rabid animals (dog, cat, cow, etc) to human cannot be overlooked. Although ingesting of well cooked meat of rabid animals is safe for rabies infection, the critical point is the exposure during processing without or insufficient personal protection.

Consuming dog meat is a common habit in the affected villages. This study suggested that the villagers did not have the risk of contracting rabies via ingestion as the meat was thoroughly cooked. Despite that, dog carcass butchers were at higher risk of contracting rabies. A research conducted as a part of the South East Asian Infectious Diseases Clinical Research Network has discovered a potentially lethal risk associated with preparation of dog meat through contact with animal secretion during dissecting without appropriate protection.[3]

All human contacts and the three dogs bitten by the rabid dog received rabies post-exposure prophylaxis (PEP) and none developed rabies. Rabies PEP was provided to excessive number of people in this study because it was also given to non-exposed cases. There was an increasing trend of rabies PEP in Thailand although the incidences of humans and animals rabies have dramatically decreased.[8,9] In Nakhon

Phanom Province, rabies PEP had increased from 4,000 doses in 2007 to 7,000 doses in 2010.[10] Based on our findings, the number of PEP could be reduced if the prescription is adhered to the WHO guideline which recommends to immunize exposed and probable exposed persons.[5]

In addition, resources should be proportionally allocated to vaccinate the principal reservoirs in order to interrupt the rabies transmission cycle. The required vaccination coverage in reservoir population to effectively stop rabies transmission is 80%[11] which was not reached in this setting. As the dogs bitten by the rabid dog had been vaccinated six months ago, one booster dose was provided to them. Unvaccinated dog should be eliminated if it was bitten by rabid animals.[12,13] However, this strategy is not well accepted by the community. Guideline on PEP in animals should be developed for better rabies management in animals.[14]

Public Health Actions and Recommendations

Immediate actions to prevent rabies should include identification of contacts and provision of PEP according to the guideline. The KAP study results should be brought into local contexts to guide people to apply personal protective practices. At last, sustainable rabies prevention and control program should be strengthened by improving rabies vaccination coverage in dogs.

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