Special Article

Moving Towards the Elimination of Rabies in Thailand

Songsri Kasempimolporn PhD*,
Sutthichai Jitapunkul MD**, Visith Sitprija MD, PhD*

** Queen Saovabha Memorial Institute (WHO Collaborating Center for Research on Rabies), Thai Red Cross Society, Bangkok*
*** Faculty of Medicine, Chulalongkorn University, Bangkok*

Human rabies is regarded as a fatal disease; however, its occurrence is preventable. Prevention consists of post-exposure prophylaxis (PEP) for humans and controlling the main cause through dog vaccination. In Thailand, health care budgets are increasingly allocated to human PEP rather than eradication of rabies in dogs. This is the case, even if controlling rabies in the dog population is a more cost-effective, longterm approach to prevent human rabies than PEP. While the principal cause of rabies is the roaming stray dogs, the impetus for control and removal is hampered by a lack of awareness of its true impact. The declaration of an annual World Rabies Day, September 8, is an initial effort to raise global awareness of the ongoing and unnecessary tragedy of rabies.

Keywords: *Rabies elimination, Stray dog, Thailand*

J Med Assoc Thai 2008; 91 (3): 433-7
Full text. e-Journal: *http://www.medassocthai.org/journal*

Rabies is a neglected zoonotic disease killing an estimated 50,000 people each year worldwide. The World Health Organization (WHO) recognizes rabies as the infectious disease with the highest case fatality rate and 99% of human deaths resulted from a bite of a rabid dog. Rabies is probably the oldest recorded infection of mankind. Transmission of rabies from dogs to people was well described in the Middle East nearly 3900 years ago[1]. It has been more than 120 years since Louis Pasteur developed the first human rabies vaccine. Dissemination of technical knowledge has largely been from developed to developing countries. Control of rabies by restriction and destruction of stray dogs became effective in Europe, North America and a few island countries. Far East Asia is the region of the world most affected by canine rabies. Rabies control advances lag far behind technical advances, as developing countries have ineffectively applied models from industrialized countries. Nearly all humans dying of rabies live in poverty.

Stray or community dogs and, to a lesser extent, unvaccinated pet dogs are responsible for sustaining endemic rabies in Thailand. Human rabies is almost always transmitted from dogs (Fig. 1). Dog bite-related rabies cases account for 70% to 95% of the reported human rabies deaths. The other vectors included cats, non-human primates and rodents. The majority of victims were children. Cases of rabies in domestic animals other than dogs have been traceable or believed to have been at the origin of exposure to rabid dogs. Most feline rabies cases are due to exposure to dogs and that there is probably only a dog zoonosis in Thailand[2]. The elimination of dog rabies is the most cost effective intervention to eradicate the rabies threat. Recently, Chinese authorities enacted a policy of permanently removing stray dogs from the streets of Beijing to reduce the risk of disease and injury. Can we expect a similar public service by the Thai authorities in Bangkok?

In a sampling survey in Bangkok conducted by the Bureau of National Statistics and the Bangkok Metropolitan Administration (BMA) in 2006, an estimate of the total pet dog population was 823,504 and that 91% of these animals (753,478/8233504) had a history of rabies vaccination (Table 1)[3]. The same survey revealed that 20% of Bangkok households (389,097/1,942,796) reported owning dogs equivalent to 2.1 dogs

Correspondence to : Kasempimolporn S, Queen Saovabha Memorial Institute, Bangkok 10330, Thailand. E-mail: songsri_k@webmail.redcross.or.th

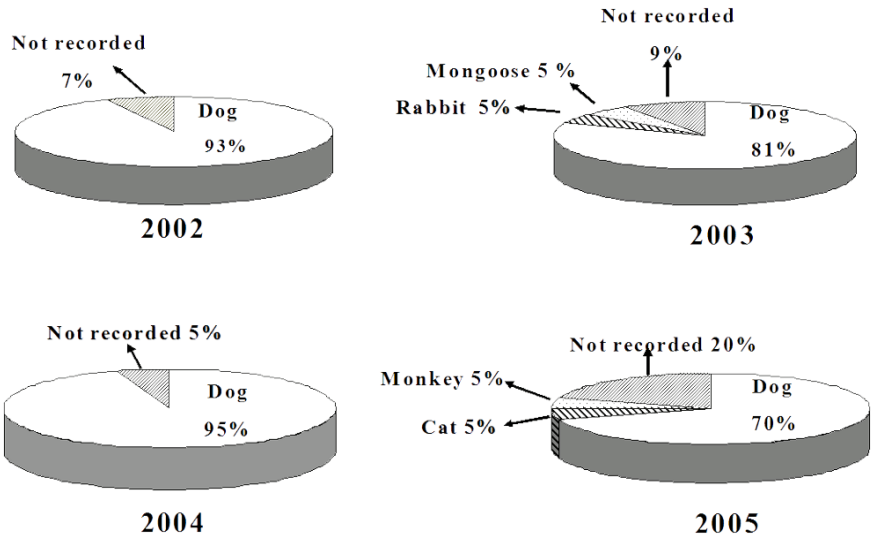

Fig. 1 Sources of rabies transmitted to man, 2002-2005

per household. In a previous survey in 1999, the number of stray dogs in Bangkok was estimated as 17% of the total dog population (110,584/633814). This number is thought to have risen steadily. The authors noticed the extraordinary number of stray dogs living on the streets. Little is known about the vaccination status in stray dogs. Most stray dogs neither carry a collar nor other signs of having been vaccinated at all. There are no reliable data indicating their status of vaccination as well as their relative population densities or distribution pattern in various areas throughout the city.

Dogs become popular as pets and stray dogs become numerous in Bangkok city. Dog-keeping practices and the duties of responsible ownership vary with the cultural setting. Restriction of dogs to owner premises was not culturally feasible. In upper class households, purebred dogs were relatively restricted, but native dogs belonging to their employees were usually allowed to roam freely. In middle class households in which both husbands and wives were employed, dogs were frequently confined while the residents were away but were allowed to roam during morning and evenings and sometimes at night. In lower class households, dogs were commonly confined at night to guard their owner's homes but were free to roam and scavenge during the day. It was concluded that most of the dogs could not be effectively restricted. The ownership status of dogs might be unstable. Most stray dogs result from people raising dogs and later abandoning them. If the public stopped abandoning animals, the problems with stray dogs would dramatically decrease. The BMA has been attempting to control the population of stray dogs in the capital by sterilizing animals housed in its shelters and then turning them back onto the streets. Although the BMA has come under strong criticism for its failure to handle the stray dog problem, the agency would not put them down. A plan to implant identifying electronic tags in pet dogs starting in late 2007 is expected to solve several of Bangkok's dog issues. Dog owners in the city will have to register their animals with the BMA and have them implanted with a microchip that will identify the owner in the event of problems. If a dog is abandoned or causes trouble by attacking people or defecating in public places, the microchip will identify its owner[4]. Dog owners can get the chip implanted at private pet clinics and register the dogs at BMA district offices. A budget of Bt 7.5

Table 1. Estimated dog population and vaccine coverage in Bangkok, Thailand. Data were compiled by the Bangkok Metropolitan Administration and the Bureau of National Statistics[3]

Dog population	1992	1999	2006
House dogs	358,936	523,230	823,504
No. vaccinated	240,786	452,034	753,478
	(67%)	(86%)	(91%)
Stray dogs	40,019	110,584	?
No. vaccinated	??	??	??

million has been set aside for only the first 50,000 dogs coming for microchip implantation as a promotion. The microchip implants are part of the BMA's code of law to control dogs, which was approved by the Bangkok Council. According to the code of law, dogs will have to be registered and have a microchip implanted within 120 days of birth. Dogs brought into the city will have to be registered within 30 days of arrival. Any move, death, disappearance or change of ownership of a dog will also have to be reported to the BMA. However, some people do not agree that microchips will solve the problems of pets being abandoned and becoming strays. It would be better if the BMA used the budget to campaign for more thought before keeping pets and more responsibility for pets. In addition, poor dog owners cannot afford the cost of implanting microchips and there were not enough BMA officers to enforce the regulation.

Despite all the prevention measures taken by Thai authorities to fight against rabies, the infection is still a danger in the country. Lack of perception of the disease burden, social and traditional beliefs, and the natural resistance of the Thai people to governmental regulation of any aspect of their daily lives play an important role in the failure of canine rabies control. Religious and cultural barriers have blocked effective dog population control by culling. The reaction of community residents to dog elimination was unfavorable. The only time when dog elimination had received community acceptance and cooperation was during local outbreaks of rabies. Dog-bite victims often experience prolonged anxiety because knowledge of rabies is widespread. Most post-exposure prophylaxis (PEP) is rendered without knowledge as to whether the biting dog was indeed rabid, and dog bites represent a huge financial burden to governments that must render PEP for animal-bite recipients. The natural epidemiologic transmission of dog rabies to humans depends on the relationship of dogs to humans and on the density of the dog population. Dog-population density is usually associated with the socioeconomic values and habits of a society. Prevention of human rabies primarily depends on controlling canine rabies; this can be achieved by mass vaccination and elimination of the stray dog population[5]. Rabies deaths, dog-bite injuries and the resulting economic losses to families and the community are individual tragedies but have only a minor impact and do not seem to create sufficient concern for action. There has been a reduction in the incidence of human rabies during the past decade (Table 2)[6]. Reasons are thought to be educational efforts, mass vaccination of dogs and effective PEP. The reported incidence of dog bites is highest in the central part of the country, e.g. Bangkok metropolis. This may be due to dense human and dog populations. Although the number of human rabies deaths is decreasing, an increasing number of patients receiving PEP have been observed during the past decade. There were as many as 400,000 patients receiving vaccination due to dog bites (Ministry of Public Health annual report). An enormous amount of funding is spent on PEP by the Thai public and private sectors amounting to at least US$ 10,000,000 per year. The cost of a postbite treatment in humans is about twenty to one hundred times more costly than the vaccination of a dog. Governments should consider investing in dog rabies as the best way to reduce escalating costs of PEP. Prevention at the animal source is the ultimate key in dealing with a prevalent and perennial zoonosis like rabies. Upstream control of rabies in dogs, including stray dogs, should rank high on the agenda of national health and veterinary authorities for an efficient prevention of human mortalities.

Animal vaccination remains the method of choice to control and eradicate rabies. According to WHO recommendations, at least 70% of the dog population has to be continuously vaccinated to control rabies effectively[5]. An intensive citywide rabies vaccination campaign was initiated in Bangkok in June 2002, with the specific aim of eliminating dog rabies throughout the city. Attempts were made to vaccinate both individual owned and stray dogs. The Thai government has invested a vast sum of money on this effort. However, rabies antibody seroprevalence among stray dogs in most districts in Bangkok still has not reached 70%. The overall antibody seroprevalence

Table 2. Human deaths from rabies, 1997-2006[6]

Year	Bangkok*/Thailand
1997	7/58
1998	4/57
1999	7/68
2000	6/50
2001	8/37
2002	0/30
2003	3/21
2004	0/19
2005	3/20
2006	2/26

* Bitten by dogs located in Bangkok

was 62% (95% CI: 54, 70%), varying from 35 to 100% by district[7]. In addition, the percentage of rabies-positive canine specimens from the Bangkok metropolis remained high (17.96%)[8]. The prevalence of rabies virus infection among 3,314 stray dogs investigated in 2004 was 0.03%[7]. This indicates that the infection is still prevalent in Bangkok. Low vaccination coverage and ineffective management of stray dogs are the most likely reasons for the dog rabies elimination program's failure[9]. It is often possible to capture stray or semi-owned dogs only once for vaccination. Developing a mass vaccination and sterilization campaign in Bangkok city alone without considering neighboring areas is unlikely to be successful. Translocation of dogs from neighboring regions is believed to have occurred regularly and could be a source of infection. Dog vaccination levels must be sufficient to break dog-to-dog transmission cycles. Local vaccination campaigns are to be conducted promptly, whenever cases of rabies appear in any neighborhood, in band of at least 5 kilometers wide around the contact zone. This has been part of Thailand's official rabies-control programs. Vaccination campaigns were not sustainable, partly due to the short life expectancy of stray dogs and their rapid population turnover. Canine surgical sterilization was also not sustainable and not significantly effective in reducing a large stray dog population. A costly intervention, such as shelters for stray dogs, has been implemented over the last 10 years. However, the financial burden made this intervention unsustainable and finally ineffective. Establishment of a robust national surveillance system is crucial and will be an important component in strategies to prevent transmission of rabies in those dogs. The value of antemortem diagnosis of rabies in dogs has recently been demonstrated[10,11]. The application of laboratory techniques for rabies virus detection in dog saliva has permitted substantial advance in early diagnosis. Laboratory-based surveillance combined with active health education and enhanced public awareness are basic requirements for effective rabies prevention and control. To promote efforts in sustainable epidemic rabies control, the veterinary public health authorities need to play roles in strengthening communities to solve the real problems. People should be informed on the rabies situation and the transmitting animals in their living area. Joint collaboration among households and community can lead to a successful rabies control mission and develop a more responsible attitude of the people towards their dogs and communities[12]. Good governance of veterinary services, better laboratory diagnosis capacity and vaccination campaigns in domesticated animals are key actions to be taken. Emphasis must also be put on the need for collaboration with other professions involved. In 2006, a group of professionals formed the Alliance for Rabies Control, a UK registered charity[13]. The declaration of a World Rabies Day, September 8, 2007 and annually thereafter, is an initial major effort to increase global awareness of rabies and to engage people to take action on this day, one for each person who dies needlessly of rabies each year.

Referrences

1. Wilkinson L. History. In: Jackson AC, Wunner WH, editors. Rabies. San Diego: Academic Press; 2002: 1-21.
2. Kasempimolporn S, Saengseesom W, Tirawatnapong T, Puempumpanich P, Sitprija V. Genetic typing of feline rabies virus isolated in greater Bangkok, Thailand. Microbiol Immunol 2004; 48: 307-11.
3. The survey of dog population within Bangkok. Thairath. 2006 Nov 20 [online]. Available from: http://www.thairath.co.th/news.php?section=bangkok&content=27212 (in Thai)
4. The Nation. Every dog will have his chip. Published on Nov 21, 2005.
5. World Health Organization. Seventh report of the WHO Expert Committee on rabies, WHO Technical Report Series No 709. Geneva: WHO; 1984.
6. Bureau of Epidemiology, Department of Disease Control. Annual epidemiological surveillance report. Nonthaburi: Ministry of Public Health; 1997-2006. (in Thai)
7. Kasempimolporn S, Sichanasai B, Saengseesom W, Puempumpanich S, Chatraporn S, Sitprija V. Prevalence of rabies virus infection and rabies antibody in stray dogs: a survey in Bangkok, Thailand. Prev Vet Med 2007; 78: 325-32.
8. Noimor T, Chuxnum T, Choomkasien P. Animal rabies, Thailand 2006. W Epidemiol Surveil Rep 2007; 38: 597-600. (in Thai)
9. Hemachudha T. Rabies and dog population control in Thailand: success or failure? J Med Assoc Thai 2005; 88: 120-3.
10. Kasempimolporn S, Saengseesom W, Lumlertdacha B, Sitprija V. Detection of rabies virus antigen in dog saliva using a latex agglutination test. J Clin Microbiol 2000; 38: 3098-9.
11. Saengseesom W, Mitmoonpitak C, Kasempimolporn S, Sitprija V. Real-time PCR analysis of dog cerebro-

spinal fluid and saliva samples for ante-mortem diagnosis of rabies. Southeast Asian J Trop Med Public Health 2007; 38: 53-7.
12. Sintunawa C, Wacharapluesadee S, Wilde H, Hemachudha T. Paradigm shift in rabies control: a system approach. J Med Assoc Thai 2004; 87: 1530-8.
13. Alliance for Rabies Control. World Rabies Day [online] 2007. Available from: http://www.world-rabiesday.org/index_en.php

มุ่งสู่การกำจัดโรคพิษสุนัขบ้าในประเทศไทย

ทรงศรี เกษมพิมลพร, สุทธิชัย จิตะพันธ์กุล, วิศิษฏ์ สิตปรีชา

โรคพิษสุนัขบ้าเป็นโรคอันตรายร้ายแรงถึงชีวิตแต่สามารถป้องกันได้ การป้องกันทำได้ด้วยการฉีดวัคซีนและเซรุ่มให้แก่คนหลังสัมผัสเชื้อ รวมทั้งการฉีดวัคซีนให้กับสุนัขเพื่อควบคุมการแพร่ระบาดของโรค ในประเทศไทยงบประมาณทางสาธารณสุขถูกจัดสรรให้กับการป้องกันในคนมากกว่าการคิดกำจัดต้นตอของเชื้อในสุนัข ผู้ที่เสียชีวิตด้วยโรคพิษสุนัขบ้ามักถูกเพิกเฉยและถือเป็นเรื่องเคราะห์ร้ายส่วนบุคคล สาเหตุหลักของโรคพิษสุนัขบ้าอยู่ที่สุนัขจรจัดซึ่งเป็นภยันตรายที่ต้องถูกกำจัด การควบคุมโรคพิษสุนัขบ้าในสุนัขคุ้มค่าและให้ผลระยะยาวมากกว่าความมั่นใจในการให้วัคซีนและเซรุ่มป้องกันแก่ผู้ถูกกัด การส่งเสริมการควบคุมโรคยังถูกจำกัดเพราะขาดความเข้าใจในผลกระทบที่แท้จริง การประกาศให้วันที่ 8 กันยายน ของทุกปีเป็นวันโรคพิษสุนัขบ้าโลก ถือเป็นความพยายามเบื้องแรกเพื่อให้ทั่วโลกตื่นตัวต่อโศกนาฏกรรมของโรคพิษสุนัขบ้าที่เกิดขึ้นอย่างต่อเนื่องและไม่สิ้นสุด